



Studies in Therapeutics.

By W. CLYDE DAVIS, M.D., D.D.S., Lincoln, Neb.

ARTICLE I.

In submitting this series of articles to the readers of *ITEMS OF INTEREST* I do not wish to assume the position of an originator but that of a fellow student, and if I can quicken the efforts of investigation of members of the profession along the line of intelligent application of medicine to our specialty, I will conclude that I have added my mite towards "possession of the field which we already occupy."

We will endeavor to take a glimpse of the therapeutic effects of drugs most commonly used by the general practitioner from *his* standpoint, i. e., "that of acceptance based on most recent authors," and then by a comparison of the similarity in expression of pathological lessons, endeavor to transfer its uses to the realm of the dental specialist.

This is exactly what is done in other specialties, notably the oculist, aurist, rhinologist, neurologist, gynecologist, etc., and much valuable assistance would be lost did they not resort to the internal and external use of medicines which to them become almost specifics in each individual case.

The dental specialists are rapidly broadening their field of practice and with it must come the intelligent application of a well-defined therapy if we would secure the full measure of our success which is necessary if we maintain the grounds upon which we as a profession are (so says the general practitioner) trespassers.

I shall not burden my reader with the consideration of the whole materia-medica (yet it would not be time wasted), but shall confine myself to those drugs in most common use which are eminently adapted to our needs, supplementing each with such formulæ as I have found of value. I shall follow no particular arrangement. Therefore let us first consider:

The expressions of disease which indicate the exhibition of aconite are, small, hard and quick pulse, especially when the symptoms are accompanied with suppressed secretions or chilly sensations. It is also indicated in sthenic fever as a heart sedative and by the wiry pulse in the initial stages of acute inflammation of any organ or tissue. It is employed in the entire range of fevers and inflammations where there is a want of power on the part of the heart and a like want of innervation to the capillary system of blood vessels and gives greater cardiac power. It is the "Child's Sedative."

Aconite. Aconite retards suppuration, adhesion, induration and hypertrophy, which can by no means be said of any other agent, and by its action upon the sympathetic nervous system control excitement, of which active hyperæmia is the initial expression. It therefore has many places in dentistry for both local and internal use.

Locally. It is valuable in odontalgia where an exposed active hyperæmic pulp is the cause, applied either singly or in combination, direct to the exposure. Also as an ingredient in devitalization paste in active hyperæmia to control the excessive irritation caused by the arsenic. Combined with iodine it has no superior as an agent to remove local active hyperæmias, irrespective of cause. It has therefore become of almost universal use in both acute and chronic peridontitis and periostitis as well as pulpitis in its early stages.

The aconite-iodine combination has no equal as a remedy with which to flush the tract of a chronic alveolar abscess rarely taking more than one application to effect resolution.

Aconite is a valuable ingredient of many liniments and lotions applied externally to relieve neuralgia where due to active hyperæmia.

Internally. Aconite is of frequent service in small doses in the abortive treatment of forming alveolar abscess on account of its power to retard the accumulation of inflammatory products. In childhood a forming alveolar abscess will almost invariably give rise to the indications for aconite, and fractional drop doses should be begun at once if that condition is suspected, for which it should be combined with echinaca and aqua calcis (consideration of which will follow in subsequent articles). In diseases of the salivary glands it should be combined with phytolacca, with which it acts most harmoniously. Also in all threatened suppurative diseases about the jaws and maxillæ the best results cannot be obtained without its frequent administration. Aconite is almost a specific in the early stages of diseases

of the throat, larynx, tonsils peridental membrane, dental pulp and in the simple and catarrhal forms of stomatitis. Aconite, if used as indicated, will do good service, that is in active hyperæmia. But it is not indicated in passive hyperæmia or further degenerative changes, either locally or internally. There are other remedies for those conditions of which we will speak later.

For odontalgia due to active hyperæmia in exposed pulp. (But of no value in passive hyperæmia.)

Formulae.
 R Tinct. aconite.
 Ol. caryophyllii aa gtt. x.

Sig. Apply on small pellet of cotton in carious cavity of tooth.

As an ingredient in devitalization paste for the destruction of pulp in active hyperæmia.

R
 Cocaine hydrochlor.
 Acidi arseniosi aa gr. xx.
 Tinct. aconiti.
 Creasoti (Merck's) aa q. s. to make a putty like mass.
 Coloring matter if desired (lamp black) only a small quantity. If pulp is in passive hyperæmia (or congestion) substitute Tinc. belladonna for the aconite.

For pericementitis and as an application to fistulous tracts:

R
 Tincti. aconiti 3 $\frac{\cdot}{j}$
 Cyrs iodinii gr. xl.

Ft. Put in glass stoppered bottle and allow to stand for one or two days.

Sig. Paint over affected membrane in pericementitis or in abscesses force through fistulous tract, by way of tooth. In periostitis and necrosis paint pocket after curetting.

As a liniment in facial neuralgia:

R
 Tincti. aconiti.
 Tincti. belladonnæ, aa 3
 Chloroform, 3 $\frac{\cdot}{j}$
 Camphoræ, 3 $\frac{\cdot}{j}$
 Aqua, q. s. 3 $\frac{\cdot}{j}0$

Sig. Bathe face over seat of pain till slight redness of skin appears.

For abortive treatment in forming alveolar abscess:

R

Tincti. aconiti, gtt.	x
Tincti. echanacea, gtt.	xx
Liquor calcis,	$\frac{\cdot}{\bar{5}} \frac{\cdot}{\bar{J}}$
Aqua, q. s.,	$\frac{\cdot}{\bar{5}} \frac{\cdot}{\bar{J}0}$

Sig. Teaspoonful every hour.

For inflammation of tonsils, salivary or mucous glands:

R

Tincti. aconiti, gtt.	x
Phytollaca,	$\frac{\cdot}{\bar{5}} \frac{\cdot}{\bar{J}}$
Aqua, q. s.,	$\frac{\cdot}{\bar{5}} \frac{\cdot}{\bar{J}0}$

Sig. Teaspoonful every hour or two hours as the case requires.

(To be continued.)

Accidents During Nitrous Oxide Anæsthesia.

By WM. CASS GRAYSTON, L.D.S., Scarborough, Eng.

The case of successful "mouth to mouth" inflation, alluded to by Dr. Pickburn in *ITEMS OF INTEREST* for February, as a means of resuscitation in alarming cases of nitrous oxide gas anæsthesia, is of interest to all who administer gas.

In England we have no specialists in extraction, and every dentist must extract for himself, and usually also administer gas. In large cities, particularly in London, it is customary for the "high-toned" dentists to call in a specialist who is always a medical man, to administer the anæsthetic. The great bulk of dental practitioners, however, either work "single handed," or with such help as a dental assistant, an office girl or a waiting maid can render. Every now and then troublesome cases occur. Fortunately, they usually terminate satisfactorily, but anyone who carefully peruses the accounts of fatal cases must recognize that the borderland between life and death is often reached. Danger may be reduced to a minimum by regularly administering gas and oxygen, or gas and air, but this will not insure absolute safety.

I will describe two cases in my experience. A

Case from patient was anæsthetized with gas alone. His color
Practice. was good during the inhalation. There was no
 stertor nor even heavy breathing. He stopped
 breathing before I considered he was in any way fully anæsthetized. I
 at once removed the face piece and extracted the teeth. There was no
 breathing. The patient was perfectly tranquil, but rapidly getting black

in the face. The usual remedies were used with no effect. Placing him on the floor, one up and down movement of the arms brought a happy smile on his face and he commenced to breathe as quietly and satisfactorily as a healthy baby.

This was a man to whom I very carefully administered gas and oxygen. I was afraid from his appearance that he would be a bad subject, and as only one tooth was to be removed, I desired to produce just sufficient anæsthesia for the purpose. A large quantity of oxygen was used, and at the faintest signs of anæsthesia, color good and breathing unobstructed, the tooth was rapidly extracted by my assistant. Then came on obstructed breathing, with the usual gurgling, choking and deep cyanosis. The tongue was immediately pulled out with forceps, but with no result. Placing him on the floor and pulling out his tongue resuscitated him.

In these two cases, and in others in my experience, tracheotomy might have been unnecessarily resorted to. I have a case in my mind in which the patient died. Tracheotomy was performed as a last resource, and the question was asked, If it had been done more promptly might not life have been saved?

I have a case in mind in which a soldier was suffocated by hydrogen gas. He had in some way been mixed up with a balloon that was being deflated. The medical officer arrived when breathing had ceased, and the soldier was apparently dead. An oxygen cylinder was obtained, the valve end was forced into the mouth and the top opened. Oxygen at an enormous pressure was, in the excitement of the moment, forced in. The soldier recovered. I can not give details. Unfortunately, I gave the report of the case to a medical man and he kept it. It was reported in one of the medical journals here, I should say twelve or fifteen years ago. The practical point to be considered is whether oxygen forced into the lungs by this mechanical means is not one of the methods of saving life if an inhalation of nitrous gas threatens it. The question naturally presents itself, Can oxygen be forced into the lungs if spasmodic obstruction occurs? Then follows the question, If tracheotomy plus artificial respiration is of no avail, should oxygen be forced through the tracheotomy tube?

Mouth to mouth inflation depends on a passage, and if this exists, surely oxygen under sufficient pressure is better. As long as asphyxial symptoms exist with nitrous oxide gas, and as long as asphyxial symptoms are produced under ether by breathing to and fro into the India rubber bag, which is such a feature of it, and are considered the best apparatus for administering ether, so will a prompt and satisfactory means of combating trouble be needed.



The Shell or Telescope Crown in Combination with Porcelain.*

By HART J. GOSLEE, D.D.S., Chicago, Ill.

VIII.

(Indications. Application to Anterior Teeth: Jacket Crowns; Malformed Teeth, Extensive Abrasion, Procedure; Band, Facing, Backing, Soldering. Application to Irregularities. Application of Facings to Bicuspid Crowns: Procedure; Preparing Crown for Reception of Porcelain, Adapting Facing, Adapting Backing, Soldering Backing, Soldering Facing. Variation of Method. Application of Saddle-back Teeth to Bicuspid and Molar Crowns: Procedure. Dowels.)

The application of porcelain facings to crown construction, wherein the shell or telescope principle of attachment to root is employed, involves several varied methods and processes, many of which are often indicated in special classes of cases, and may be productive of practical and artistic results.

While the modern application of the ceramic art doubtless offers far greater opportunities for more æsthetic and hygienic achievements in this line of work, the essential requirements of *strength* as applied to the method of attachment to the root, as well as to the completed crown, are factors not infrequently contraindicating its use. These, together with the absence of facilities, or the lack of experience and skill, may often indicate

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the combination of gold and porcelain as a means of obtaining increased strength, and of securing, or more closely approaching, the desired artistic and æsthetic result.

Indications. The application of this style of crown construction is especially indicated in that class of cases where it seems desirable, or becomes necessary to utilize a portion of the remaining natural crown for the attachment of the artificial substitute, by telescoping it instead of sacrificing it to the gum line and employing a dowel; and where the presentation of porcelain is essential to the artistic requirements.

Those conditions in which these combined requirements are particularly applicable, and the preferable and most practical methods of subserving them, will be considered in their respective classification.

Application to Anterior Teeth.

The application of this style of crown to the six anterior teeth, upper or lower, is frequently indicated, but should be made only in the absence of a better method, and in accordance with the judgment and discretion of experience, because the practicability of the principles involved has been much abused by the indiscriminate and too extensive use of the design known as the jacket crown.

Jacket Crowns. The so-called jacket crown is often a most useful style of construction, but is particularly so in the restoration of malformed crowns of teeth, as previously indicated in Fig. 29, and in those conditions of extensive abrasion. As the proportions of the remaining natural crown, however, are ordinarily retained at the expense of the *strength* of the artificial substitute, because of the limited amount of space, the requirements of occlusion and alignment must be, or be made, *favorable* to the reception of a crown possessing sufficient strength to withstand the stress. For this reason the use of gold in combination with porcelain facings usually affords greater strength than porcelain work.

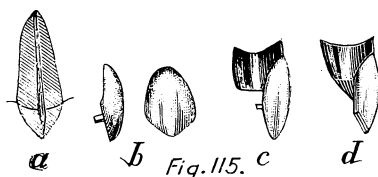
Malformed Teeth. In the restoration of the crowns of malformed teeth the use of the jacket crown is particularly applicable because of the usual favorable shape and formation of the natural crown; and for the reason that it is often desirable to preserve the vitality of the pulp in such teeth, because of the probable unfavorable length and imperfect development of the root, which might often preclude securing adequate mechanical attachment of a dowel crown.

In such conditions the destruction of the natural crown would, of course, be of doubtful advantage, and sometimes even unwarrantable; and

the preservation of the vitality of the pulp presents a favorable prognosis because usually so little mechanical preparation would become necessary that no great shock or irritation would be induced, and the dentine is not deprived of the protection of its coat of enamel.

This style of crown is also frequently indicated **Extensive Abrasion.** as a means of arresting the destructive influences of abrasion, and restoring the natural crown in a useful and æsthetic manner. If the occlusion in such cases is, or may be made, favorable for, and the requirements indicate the use of, porcelain facings, the preservation of the remaining natural crown may afford the advantage of a more accurate and perfect reproduction of the occlusal surfaces, and at the same time adequate stability to the attachment of the crown.

The advisability of destroying the vitality of the pulp in these cases is much a matter of judgment, but is not always essentially a prophylactic measure, because such conditions are not usually found in early life.



Hence, as a result of the combined influences of age and continued attrition, the pulps have usually receded, and the canals are not infrequently found to be partially or entirely obliterated. The degree of sensitiveness manifested during the necessary mechanical preparation will serve as a guide, however, in indicating the requirements in this connection.

The first procedure constitutes the preparation of the remaining natural crown until its periphery presents a favorable shape for the accurate adaptation of a band, and the *labial*, *lingual* and *incisal* surfaces are sufficiently reduced to afford accommodation for a facing, and admit of a favorable occlusion. (Fig. 115, a.)

A band of about 30-gauge 22-karat gold should then be fitted to the root, passing just freely beneath the gum. After completing the adaptation of the cervical end, the *labial* portion should be cut away on a gradual slope, closely following this surface of the remaining crown, until the facing may be carried to the gum line. The *lingual* portion of the occlusal end should then be trimmed until it offers no interference to the occlusion, after which the

interior of the band, in position on the root, should be filled even to its edge with wax, and the bite and impression secured.

Facing. When the model has been obtained and mounted upon the articulator, a facing of the thin neck variety or mould (Fig. 115, b.) should be selected and ground to place, with a slight allowance for the thickness of the backing.

Backing. Pure gold, 34-gauge, should now be closely adapted to the entire lingual surface of the facing, so as to join or come in direct contact with the band along its labial and cervical edge when adjusted to position (Fig. 115, c.). When the backing has been properly burnished and trimmed, and anchored to the facing by bending the pins, the band should be detached from the model, then replaced to position and the proper relation between it and the facing sustained with adhesive wax. The joint between the band and backing should also be filled with melted wax as a means of keeping it clean and facilitating the subsequent union of the two with solder.

Soldering. When invested, the wax should be removed and a small cap of 22-karat or pure gold closely fitted to the *interior* edge of the band. The case should now be fluxed, heated and soldered, with as much re-enforcement and contour as the occlusion will permit. (Fig. 115, d.)

In cases where a broad, flat contact surface for the opposing teeth may be required, successive layers of clasp metal may be attached with solder until a favorable occlusion is secured. In this event the incisal end of the thin pure gold backing must be also adequately re-enforced with solder, though a better method of backing for such cases will be subsequently considered.

It will be noted that the adaptation of the crown to the projecting conical end of the natural tooth is not close, but a closer conformation is usually unnecessary if the cervical edge fits, as the increased quantity of cement thus used in mounting adds materially to the strength of the attachment.

If, for any reason, a more perfect adaptation may seem indicated, or desirable, it may be easily secured by burnishing or swaging a cone of pure gold, 34 to 36 gauge, or platinum foil, 1-1000 in thickness, to the tooth in the mouth, after the band has been fitted and trimmed; then adjusting first the cone and then the band to position, removing them *in situ*, with their relation sustained with wax, and investing and soldering them; when the crown may be completed as indicated.

Such a procedure is seldom required or even warrantable, however, because so little cement could be used in mounting that a more or less weak attachment would necessarily result. While the simple telescoping

cone is sometimes used without the band, the latter is essentially advantageous as a means of securing sufficient strength at the cervical end and adequate adaptation to the root beneath the gum.

When the crown has been finished and polished, the remaining natural tooth should be roughened or slightly serrated with a thin edge stone, or sharp bur, before mounting, as such a procedure offers a mechanical supplement to the adhesive properties of the cement, which affords increased strength in the attachment.

Application to Irregularities.

The jacket crown may also be found occasionally useful in the treatment of irregularities, where the character and position of the teeth, and the age of the patient, may not warrant the usual procedure for their correction.

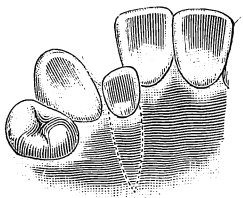


Fig. 116.

The method advocated by Dr. George Evans is illustrated in Fig. 116, and consists of constructing a gold crown for the malposed tooth, and then attaching a facing to it by means of a heavy round wire, so adjusted as to carry the facing in its proper relation to the adjacent teeth, and to be free of the occlusion.

The more or less conspicuous appearance of the gold crown, even though partially hidden by the facing, is an objectionable feature, however, and equally useful and more artistic results could be usually obtained by sacrificing the natural crown and adapting a dowel crown to support the facing in its proper position.

Application of Facings to Bicuspid Crowns.

As a means of eliminating the objectionable and conspicuous display of gold in crowning the bicuspid, the application of porcelain facings to gold crowns is frequently indicated, and, if skilfully executed, approaches the more artistic results achieved in the use of porcelain work, or dowel crowns.

While various methods are advocated and employed, a slight modification of the one suggested by Dr. Hollingsworth meets the requirements in the most practical, artistic and expeditious manner.

Procedure. In the procedure the gold crown should be first constructed by any of the various methods in which the swaged cusp is used, but the band and cusps should be soldered with 22-karat solder, and *no* re-enforcement of the cusp made at the time of uniting it to the band.

When thus completed, and roughly finished, the root should receive further and proper preparation for the accommodation of the porcelain facing. This constitutes sacrificing the buccal surface on a gradual slope to the lingual, at an angle sufficient to admit of the presence of the facing when placed in position on the crown, as previously illustrated in Fig. 40.

Preparing Crown for Reception of Porcelain. The crown should now be adjusted to the root and the outline of the exposed area, to be occupied by the facing, marked in the gold with a sharp-pointed instrument, and subsequently cut out with a fine saw, as indicated in Fig. 117, a.

After filing the edge smooth and even, with the convex surface of

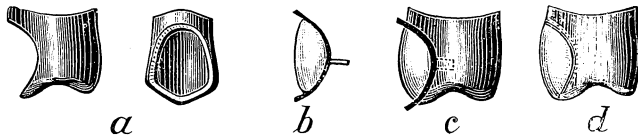


Fig. 117.

a fine half-round gold file, a thin *cuspid* facing of proper size and color should be selected and ground to place.

Adapting Facing. While the grinding may be done on models, when necessity or occasion requires, the most accurate results can be accomplished by filling the interior with wax, when in position on the root, and completing the adaptation in the mouth. In grinding to the necessary alignment, and approximation with the edge of band, care should be exercised to avoid sharp angles and any unnecessary weakening of the pins.

Adapting Backing. When the desired adaptation has been completed, a sufficient allowance for the thickness of the backing should be made by further grinding the facing or the band, or both; and the facing then backed up with pure gold, about 34 gauge. In the adaptation of the backing a small surplus should be allowed to project beyond the facing at all points (Fig. 117, b), and care must be exercised to avoid overlapping it, to accomplish which it may sometimes be necessary to cut out a small V-shaped piece at each occlusal angle.

The facing and backing should now be placed in position on the crown, and a sharp instrument passed around the buccal edge of the crown, marking the proper relation between it and the backing (Fig. 117, c), after which it should be detached, and the backing soldered to the crown from the

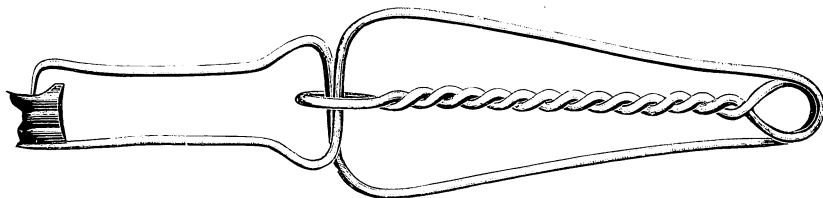


Fig. 118.

outside with 20-karat solder, using enough to form a *smooth* joint, which may finish down *flush* with the porcelain when the surplus is removed; and the necessary re-enforcement of the cusps should be made at this time.

The proper relation between the parts may be most easily and securely sustained while soldering by the use of pliers similar in design to those previously recommended for attaching cusps, or the ordinary nickel soldering pliers may be used by bending one end at right angles, as indicated in Fig. 118.

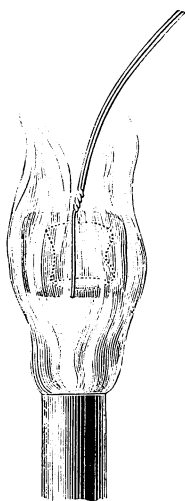


Fig. 119.

When the soldering has been completed, the facing should be adjusted to position and the surplus trimmed down until a *smooth* edge presents between crown and facing, being careful to *avoid any overhanging edges of metal upon porcelain*.

Soldering Facing. While the permanent retention of the facing may be secured

by bending the pins down against the backing, on the inside of the crown, greater strength will be obtained by soldering, on account of the extreme thinness of the backing. This may be quite easily accomplished by first bending the pins down close upon the backing, and then wrapping the crown with one thickness of asbestos paper, with the

occlusal end folded together, and the whole held in place by wiring. The backing and pins should then be fluxed, preferably with liquid flux, and a sufficient amount of 18-karat solder also fluxed, and placed in position. This should now be carried to the flame, with the *porcelain downward*, and *gradually* brought to the point of greatest heat (Fig.

119), when a small flame from the blow-pipe may be directed upon the facing until the solder fuses, which can be readily observed from the open cervical end.

While this or any other style of investment is not altogether necessary, if extreme care be exercised in subjecting the crown to the heat, the use of asbestos paper possesses the advantage of absorbing but little, if any, heat, and of precluding the possibility of fracturing the facing, by distributing it evenly.

When the soldering has been completed, the crown should be treated to the acid bath, and then finally polished (Fig. 117, d), and mounted.

If an undue prominence of the root interferes with its proper adjustment, it may become necessary to sacrifice more from the buccal surface, but the lingual surface should always be allowed to remain as long as possible, in order to afford the greatest degree of strength to the attachment.

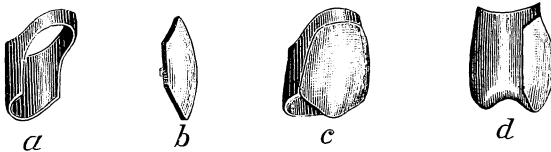


Fig. 120.

Another process or method productive of practically the same results, but entailing a different procedure, is employed by many. This constitutes first making the band, and fitting it to the root, and then cutting out the buccal surface to accommodate the facing as indicated in Fig. 120, a.

The usual bite and impression should now be taken and the models secured and mounted upon the articulator. A cuspid facing of suitable size and color is then ground to place until the proper alignment, and a perfect joint with the cervical and approximal edges of the band, are secured. After backing the facing with 30-gauge 22-karat gold, and bending the pins (Fig. 129, b), the band should be detached from the model, the facing placed in position upon it, and their relation sustained with a *minute quantity* of fluxed wax. Asbestos paper should now be wrapped around the parts and wired, as indicated, and the joint between the two filled with 20-karat solder (Fig. 120, c).

This portion of the crown should now be readjusted to the models, and the cusps formed to fit the band and facing, and meet the requirements of occlusion, after which they should be filled with 18-karat solder.

In attaching the cusps to the band and facing they should be first

retained in proper relation by the use of a small quantity of fluxed wax. Asbestos paper should now be wrapped around the crown with the occlusal end knuckled in *close* to the cusps, and then wired securely to place by twisting the wire very taut around the approximal and occlusal surfaces, to sustain the relation of the cusps, as well as having an additional piece pass around the center of the crown to hold the paper together.

With the surplus ends of the wire projecting from the *cervical* end of the crown, it may be carried to the flame, *cusps downward*, and so held until the solder, already in the cusps, has re-fused and united with the band.

If insufficient solder has been placed in the cusps to accomplish union in such manner, more may be added at this time, and, as in the previously mentioned method, if any danger of re-fusing or unsoldering joints, already made, seems probable, the same can be overcome and prevented by first coating them with a solution of whiting in alcohol or water, or other similar means.

After soldering, the crown should be allowed to cool slowly and gradually, then removed from the investment, finished and polished (Fig. 120, d).

While such crowns may be invested in ordinary investment material, the soldering can be accomplished with equal facility and accuracy, and much more easily, in this manner.

Application of Saddle back Teeth to Bicuspid and Molar Crowns.

The application of the saddle-back tooth to the construction of bicuspid and molar crowns is sometimes practicable as a means of admitting of the shell or telescope principle of attachment, and of affording an artistic and æsthetic result, because of presenting an occlusal surface of porcelain.

The element of strength possessed by such a crown, however, depends much upon the amount of space, and the force of the masticating stress, in the individual case; as the *lingual cusps* are weak points, unless sufficient space exists as to require but little, if any, grinding, and adequate opportunity is offered for protecting and supporting them.

In the procedure incident to the construction of
Procedure. such a crown, the band should be made and fitted in the same manner pursued for an all gold crown, and the bite and impression then taken.

The root should be afterward sacrificed and trimmed to accommodate the presence of the porcelain.

When the models are mounted upon the articulator, a saddle-back

tooth (Fig. 121, A), the occlusal surface of which approximates the size and proportions of the band, should be selected. In no instance should the porcelain be much *smaller* than the diameter of the band, but in the event of its being too large it may, of course, be ground to proper proportions.

The band should now be detached from the model and cut away with curved-pointed shears to admit of the proper adjustment of the porcelain (Fig. 121, b).

The porcelain should then be carefully ground until it meets the requirements of alignment and occlusion, comes in contact with the remaining cervical edge of the band, and fits into the *interior* of the lingual and occlusal portion.

It should now be backed up with pure gold, about 34 gauge, securely attached by bending the pins (Fig. 121, c), and then placed in position on the band, and the proper relation sustained with melted wax.

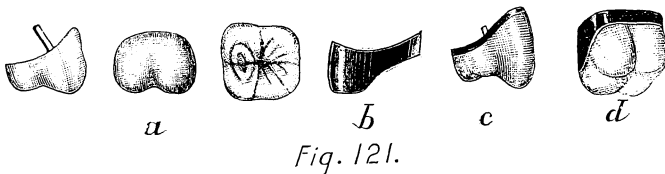


Fig. 121.

After filling the interior with soft wax to keep it clean, the crown should then be invested by submerging it in a slight covering of investment material, leaving only the wax exposed.

Upon removing the wax the interior of the crown will be exposed, when flux can be applied and sufficient solder placed over the pins and around the joint. The case should then be gradually heated to a red heat, when a small flame from the blow-pipe, directed into the crown, will quickly accomplish the soldering.

When removed from the investment and subjected to the acid bath, the band should be burnished up closely to the porcelain, and the crown finished and polished (Fig. 121, d).

Dowels.

In the application of crowns constructed by these latter methods, the shortness of the root may sometimes indicate the use of a dowel as a means of supplementing the band and affording a stronger attachment to the root. When such is required, or seems desirable, it should be first fitted to the canal and a projecting end extended into the lingual portion of the crown as far as its proper adjustment will admit. The dowel should then be cemented to place in the root, and the crown separately and subsequently mounted.

Experiments with Modeling Composition

By DR. STEWART J. SPENCE, Harriman, Tenn.

The following experiments were made with the object of determining:

1st—What is the exact contraction of impressions taken in modeling composition at different degrees of temperature;

2d—Whether the adhesion of the composition to the impression cup prevents or otherwise affects this contraction;

3d—Whether a high heat of the composition is necessary in order to prevent a retraction (after withdrawal from mouth) of parts of the impression stretched in taking the impression; and

4th—Whether an impression dragged out of form while being removed from the mouth will by retraction resume its proper shape.

As results of these experimental inquiries, it was found:

1st—That this excellent impression material contracts about $\frac{1}{35}$ of an inch in six inches in falling from 110° to 35° Fahr.

2d—That the adhesion of the material to the tray has no perceptible effect on this contraction;

3d—That a high degree of heat in taking the impression is not necessary to prevent subsequent warpage of the impression; and

4th—That its elasticity, even when the impression is tolerably stiff, is not sufficient to cause impressions when dragged in removal to fully resume their correct forms.

The experiments were conducted thus:

To determine the contraction of modeling composition in cooling.

Experiment 1. Modeling composition was heated and then pressed into the lid of one of the metal boxes in which vulcanizable rubber is supplied to dentists, this being, as we know, nearly six inches long. It was then cooled, and was next immersed in warm water, with just sufficient of one end projecting from the water to permit of watching its expansion and contraction. A thermometer was also placed in the water. Under the influence of the heat, the composition was seen soon to expand, creeping up to its original position, so that by the time it had risen to 110° , it was once more in contact with the end of the lid. On the temperature being raised to 115° , the composition became quite soft. The heat was now turned off, and the process of cooling was commenced by adding cold water to the hot. During reduction of temperature, the material began to exhibit a very slight contraction at 100° . This con-

traction was perceptibly increased when a second addition of cold water reduced the temperature to 90° . At 80° the contraction was correspondingly increased, and at 70° it had proceeded so far that there was a space between the composition and the end of the lid, into which three thicknesses of paper cut from ITEMS OF INTEREST could be inserted. At 60° the shrinkage admitted four thicknesses of this paper, and at a point a little above freezing it admitted seven. Now, as the copy of the ITEMS OF INTEREST was $\frac{1}{4}$ inch thick and contained sixty sheets, this gave about $\frac{1}{35}$ of an inch as the contraction of six inches of modeling composition, in passing from 110° to about 35° F. This would be nearly $\frac{1}{105}$ of an inch in an impression measuring two inches; less than 0.25 millimeter.

Even if all of this contraction were reproduced in a plate, it would probably have only a beneficial effect on its adhesion to the membrane in soft mouths, but as the model is taken from the impression usually when the latter is at about 70° F., the contraction above mentioned must be reduced by half, making it about 0.12 millimeter. When it is considered that the expansion of the least expansive kinds of plaster is not less than 0.35 millimeter in two inches, this feature of contraction is seen to be one of the main virtues of modeling composition.*

To test the expansibility of beeswax, "sticky wax" and paraffine wax.

Experiments similar to the above were made in pure beeswax, also in the paraffine wax put up by the Standard Oil Co., and in the composition sold as sticky wax. The beeswax was found to have about the same contraction as modeling composition, while sticky wax seemed to have a trifle more. The paraffine showed very great contraction, about $\frac{1}{16}$ of an inch in the length of six inches. This contraction of wax should be remembered in waxing up plates, bridges, etc., and in waxing together broken parts of plates, the operator holding the parts, if movable, in place till the wax is cool, to prevent their being drawn out of position by its contraction.

To determine the effect on contraction of adhe-

Experiment 2. sion to tray.

As modeling composition is somewhat disposed to loosen from the impression cup in places during withdrawal of impression, it has been my practice, and probably that of others, to stick tray and material together by holding bottom of tray over an alcohol flame, then chilling this heated region before placing the impression in the mouth.

Knowing that resistance to expansion will cause warping of plaster casts, it occurred to me that the resistance to contraction offered by this

*The writer uses a plaster treated to prevent expansion, and speaks above of commonly existing conditions.

adhesion of the composition to the tray might cause a somewhat similar warping, or at least prevent contraction. The first test was made thus:

Softened composition was pressed into the before mentioned lid of vulcanizable rubber box, filling it, and then the two were stuck together by the alcohol flame, and cooled in cold water. It was then seen that, despite the firm adhesion of the composition to the lid, the usual contraction had occurred in cooling, for though the material remained firmly adherent to the metal, it showed the space at the ends. Neither did it bulge nor warp, for after being forcibly torn from the lid, on being placed back there it sucked to the lid enough to lift it.

A second test was made thus:

An impression cup was filled with softened composition, and into this was pressed an old plaster model, then withdrawn, thus producing a condition similar to an ordinary impression of the upper jaw. The alcohol flame was then applied to the tray to produce adhesion. The object now was to see whether the buccal surfaces of this impression would contract towards each other, or whether they would remain so adherent to the tray as not to approach each other during the cooling of the composition. To accomplish this, two flat headed tacks were stuck into the buccal surfaces of the impression, so that their heads faced each other across the palatal surface. A little stick of orange wood was then cut to the length of the space between the two tack heads, so that when placed end to end against them it was held by them in place with just sufficient pressure to prevent it falling away. Then, without wetting the stick, the impression was chilled, and it was found that so tightly was the stick held by the tacks, due to the contraction of the modeling composition in cooling, that the whole case could be lifted by it.

These two experiments seem to show satisfactorily that adhesion to tray has no influence upon the warpage or contraction of modeling composition impressions.

To determine whether the elasticity of modeling composition is enough to cause impressions to lose shape by retraction after withdrawal.

Experiment 3.

A year or so ago, there appeared in several of the magazines, an item advising high heating of composition in taking impressions, in order to avoid a tendency of the material to retract as soon as the pressure on the impression is withdrawn by its removal from the mouth. This matter was tested thus:

A roll or rope of the composition, about $\frac{3}{4}$ of an inch thick and about a foot long, was made by heating two cakes of it to 120° F. and rolling them together. A board was then taken, with cleats nailed down on its face at each end, leaving a space of thirteen inches between cleats.

This rope of composition thus heated was stretched to reach from cleat to cleat, when, on being let go, it retracted a mere trifle—about four thicknesses of ITEMS OF INTEREST paper. It was next allowed to cool until its temperature was lower than is ever used in taking the impression, perhaps 95° F., when it was doubled up and again rolled into a rope and once more laid between the cleats, stretching it to reach them as before, when on being released, it immediately retracted about $\frac{1}{4}$ inch.

These two experiments demonstrated that there is greater elasticity in this material when warm than when hot, but not much in either case. A third test was thus made:

It was again doubled (without reheating) and again rolled and stretched between the cleats, and a strip of wood was laid along it and held there by slight pressure for forty seconds. In this case no retraction occurred, neither during nor after removal of the pressure. This demonstrated that its elasticity would be overcome by the pressure maintained by the operator in holding the impression in the mouth, even were it used much colder (and therefore more elastic) than it ordinarily is used. (The reader must not confound this retraction with contraction.)

To determine if the quality of retraction in
Experiment 4. modeling composition is enough to cause impressions when dragged out of shape while being withdrawn from the mouth to resume their proper shape.

It has always seemed to me that two or three minutes is hardly sufficient time to allow for the stiffening of modeling composition impressions in the mouth, and that when then taken out they are very apt to be dragged out of shape either by pressure against the cheeks or lips or by adhesion to the palate. By heating a lump of this material to 110° F., and then removing it from the hot water and pressing the bulb of a thermometer into it, I found that it required (with the surrounding temperature at 70°) no less than eight minutes for the heat of the lump to fall to 98°. At this temperature it is quite stiff enough to be removed from the mouth without bending. But it is probably often withdrawn when no lower than 105°, at which temperature, as the following tests show, this material has but little tendency to return to any form from which it has been dragged.

The previously mentioned rope of composition was again used, heated to 110° F., rolled out and stretched on the before mentioned cleated board, with a thermometer imbedded in its center, and allowed to fall to 105°. At this temperature one end of the rope was bent upward, then let go, in order to test its power to resume its old position. This it quite failed to do, returning only about one-fourth the distance it

had been bent. The other end was then taken and stretched, but on being released it shrank back only about one-fourth the distance it had been stretched. The rope was then allowed to fall to 100° F., when these trials were repeated with more favorable, yet anything but perfect results.

These two last experiments seem to teach that it is not necessary that modeling composition be very hot when placed in the mouth, but that it should be allowed to thoroughly cool before being withdrawn therefrom. As, however, it can perhaps never be known with certainty when dragging does not occur at the palate, it is safe practice to return it to position, after partial withdrawal, and hold it there for about half a minute.

But while it is not *necessary* that modeling composition should be very hot when placed in the mouth, this is true only when sufficient compression can be made against the labial and buccal walls to overcome the tendency of the impression to fail to hug the upper portions of these walls, which tendency is greatest in the least heated material. If the reader will try this experiment by forcing a plaster model into composition held in an impression tray, he will observe that the material rises considerably higher than where it actually touches the model. By curving his middle finger and palm of hand around this portion, he can press it easily to place, but it does not tend of itself to assume correct position. Therefore, it is well to insert the material while quite hot and soft, when this tendency is least, and also when the ridge can be forced deeply into the tray and the support of the tray's flanges given to this critical portion of the impression.

Dr. W. H. Atkinson taught that there is an undesirable tendency in impressions, especially those taken in modeling composition, to force upward the membrane along the upper labial and buccal surfaces, where it passes from jaw to cheek, and so tighten that portion of it which ought to lie on the jaw as to give a defective impression—an impression of the stretched membrane instead of the jaw. To remedy this, he recommended the cutting away of all excess of the impression, slightly reheating and reinserting it. He had probably observed the tendency of composition to fail to hug the upper portions of the labial and buccal surfaces, attributing it, however, to other than the right cause, as I think. His remedy, however, appeals to one's judgment as good, though unnecessary perhaps if the simpler ones above mentioned are employed; still it is worthy of mention.

My paper, though direfully lengthy, has by no means exhausted the study of modeling composition. I have made no experiments to show whether this material compresses the soft parts more than does moderately stiff plaster, still less whether such compression is beneficial. Dr.

Haskell, I think, believes it is not. Nor have I been able to experiment on the results of taking the model from the impression at various degrees of temperature, as affecting tightness of fit, as I hope to be able to do, for it would be very interesting to know how far contraction is beneficial, if at all. One thing may be said in this connection. Contraction of impressions proceeds from circumference to center, therefore a plate made from a contracted impression would (assuming that the model remains unchanged) press hard against the buccal and labial surfaces but be drawn away in the direction of the center from the walls on the other side of the ridge—the sides of the palatal arch. If this be so, it would seem that better results might be obtained by varnishing a non-expanded plaster impression with several coats of varnish, and thus obtaining a uniform reduction of size in the model.

The temptation, because of cost, to use the same lump of modeling composition in different mouths, and the difficulty of rendering it antiseptic, is another phase of the subject which presents itself for the serious consideration of the profession.

Bridge Anchorage Without Band or Crown.

By D. T. HILL, D.D.S., Syracuse, Neb.

We take it as granted that the display of gold is objectionable, violating as it does the artistic. The gold shell crown, as all must admit, is the most secure anchorage for bridge work. Its practicability is unquestioned, but the display of gold excludes its adoption in the front of the mouth. The band is contrary to mechanical security, and at best, simply an incubator for microbes and a harbinger of decay and loss.

We are frequently called upon to supply lost bicuspid, and I will briefly state a plan which I have adopted, and which seems to answer the purpose well, by which the gold crown or band are dispensed with as an anterior anchorage.

I will cite one case which will convey my idea.

**Method of
Procedure.**

Suppose both upper bicuspid are to be supplied by bridging from the cuspid to the first molars. A shell crown used as a secure anchorage over the first molar in the usual way will be used. With a twist drill, drill into the approximal surface of the cuspid through the enamel and into the dentine, judgment being used not to go too deep; then take a piece of orange or other hard wood and with the same drill, drill a hole through the hard

wood; take 32-gauge gold plate and roll it around drill, then insert in hole left by drill in hard wood; by passing through this hard wood, a perfect fit may be secured; solder with a minute piece of solder the lap of gold; square the end of the tube and place on gold plate or platinum foil; drop a small piece of solder in tube and solder.

We now have a gold tube with one end closed; file this soldered end down true with circumference of tube, and it will very accurately slip into cavity in the cuspid. Place a small quantity of cement in cavity quite thin and press tube to place; after the cement has set, dress the tube down as you would a gold filling. At this point, to exclude the possibility of the cement being dissolved, around the tube, insert a cone-shaped bur-nisher and by a wringing motion the gold tube will be spread until it fits with mechanical exactness. Re-dress the gold as you would a filling and polish.

We now have the gold tube securely anchored in the cuspid and the cavity more perfectly filled than by any filling device.

Having previously fitted a piece of iridio-platinum wire into the tube, place in position and with gold crown in place over the molar, take impression in the usual way (though I prefer the impression without a cup, thereby obtaining not only the impression but the bite or articulation at the same time); the pin which enters the cuspid will come away with the impression or may be placed in position and the model made.

The pin is to be soldered to one end of the bridge and a gold crown to the other. When completed, in case the pin, on account of the end being square, will not allow the crown to telescope over the molar, file the upper edge of the wire, making it oval, which will compensate for the entrance of this spud before the gold crown is pressed over the molar.

Before placing the bridge in position, I would recommend that the end of the spud be filed, that it may not go to the bottom of the tube, and that this space be filled with gutta percha as a non-conducting pad. Heat the end of the spud when the bridge is to be set, which will soften the gutta percha, the surplus of which will fill up the space made by filling the top of the spud to facilitate the telescoping of the molar crown.

The result of this method I have found quite satisfactory, inasmuch as no gold is displayed, no annoying band is present as a constant menace and the V-shaped space between the cuspid and first bicuspid is maintained, which allows the brush to enter and keep the parts in a hygienic condition.



The Ethics and Prosthetics of Crown and Bridgework.

By HART J. GOSLEE, D.D.S., Chicago, Ill.

Read before the Second District Dental Society, Brooklyn, Jan. 13, 1902.

In a consideration of the ethics and prosthetics of a specialty so modern and broad as is crown and bridgework it seems but natural to be confronted with some phases of the subject which should be regarded as serious problems.

For the reason that the principles underlying any distinct line of art or mechanics are not the product of a few years, such as are those underlying this particular field, and in view of the fact that our application of these involves physiological and therapeutic environments, would it be reasonably consistent to expect otherwise?

Some phases of this subject *must* be so regarded, because they involve the preservation or destruction of the natural teeth, and incidentally the health and comfort of the patient; because they bear with material importance upon the success and practicability of this class of work in general, and because of the pronounced diversity of opinions entertained concerning their solution.

Conspicuously among these are the questions propounded by your committee and under discussion in this instance. Indeed, I am constrained to pay tribute to the scientific and practical value of their selection, but must candidly acknowledge at the beginning that, in my opinion, some of them are necessarily, and perhaps properly, moot questions, the solutions of which may only be derived from extensive experience and close clinical observation, and even then much will depend upon personal equation and the degree of individual skill and ability displayed.

As a specialty of dental prosthesis wherein the highest achievements in art and mechanics are possible, and may be so closely blended, modern fixed or stationary bridgework is a success *only* in proportion to the degree of judgment used in its application and of skill manifested and evidenced in the detail of its construction; and as these essentials are observed the practicability and usefulness of such work increase or diminish.

In no other field in dentistry, probably, is it possible for one's efforts to meet with such a wide range of artistic possibilities, and to result in such a degree of usefulness and comfort. Yet, paradoxical though it may seem, no greater opportunities are afforded for such a profound and barbaric display of injudicious, unskilful, unsightly and unhygienic operations.

In the construction of bridgework the demands and requirements are so diversified, and the great law of variation enters so prominently into each case presented, that no general laws or set rules can be made universally applicable; nor have we the benefits and advantages to be derived from the experiences of an indefinite time to guide and govern us; hence, to a large extent, we can only depend upon close observation and the acquired or intuitive genius of a practical mind for the adoption and execution of such principles and methods as seem indicated, and to offer at least reasonable opportunities for successful results in the individual case.

**Devitalizing Pulp
in Teeth
to be Crowned.**

The first question, that of the feasibility of placing crowns upon teeth possessing vital pulps, presents in many respects a most serious problem. It is a subject which has occasioned much discussion, criticism and comment, since the very advent of this work, and arrayed upon each side are many of our most esteemed and skillful practitioners. Prominent among those leaning toward, or advocating, the procedure as a general practice are such men as Kirk, Harlan, Barrett, Broomell, Peck, Rhein, Hoff and others, while Black, Guilford, A. O. Hunt and others are equally as vehement in opposing and denouncing it.

Certainly no one will dispute the fact that the destruction of the vitality of the pulp of a tooth, whether it is to be subsequently crowned or not, is sometimes a serious matter, and in analyzing the theories for and against the practice much logic is evidenced.

Those *opposing* such procedure, when done solely for the purpose of placing the root or tooth in a condition more favorable for the permanent attachment of an artificial crown, affirm that, in the *first* place it is unnecessary; *second*, that it entails additional work; *third*, that its successful

accomplishment is codependent upon the degree of perfection with which the root canals are afterward filled, and, *fourth*, that the preservation of the pulp adds to the longevity of the root by precluding the susceptibility to disintegration.

Those either advocating the practice or favoring it in a general way assert that it becomes essential, first, to *admit* of the necessary mechanical preparation, and, second, as a prophylactic measure against the possibility of subsequent pathological disturbances arising as a sequence of destructive processes, superinduced by the establishment of abnormal conditions.

In my opinion the destruction of the vitality of the pulp in a large percentage of cases is conducive to the best and most permanent results, wherever the crown is extended beneath or within the free margin of the gum. This belief arises from the fact that such a crown is indicated in two general classes of cases: First, as a means of restoring the individual tooth, much of the structure of which has been lost by the process of caries, and, second, where the tooth in question is to serve as an abutment for bridgework, even though it be perfectly sound.

**Crowning
Carious Teeth.**

In the first class, where the tooth has already been attacked by the ravages of decay, to a greater or less extent, if the vitality of the pulp is to be preserved, it will become necessary to reduce any existing inflammatory condition, to thoroughly disinfect the remaining structure, and then to place a non-irritating capping over the pulp, whether it be actually exposed or not. Is it always possible to re-establish a permanently normal condition in structure previously subjected to irritating influences, by removing the cause, and to thoroughly and efficiently disinfect the remaining dentine and the contents of the tubuli, where the destruction is so great as to indicate crowning? Is it always successfully accomplished? Is pulp-capping in the event of more or less extensive decay regarded as a success? Is the possible *pressure* or resulting irritation from mechanical influence not likely to be injurious?

While I think that an element of doubt, at least, is predominant in the consideration of all of these queries, I also believe that the possible *irritation* to such a pulp, whether arising from the necessary strength and potency of a successful disinfecting agent; from the mechanical pressure; from the cement or other capping or mounting material; from the shock induced by the necessary grinding in obtaining a proper preparation, or from the abnormal isolation from external influences of temperature and secretions, is a factor in causing, or a combination of them a means of inducing, the ultimate occurrence of a slow but quite frequent process of destruction, and warrants the prophylactic procedure in the majority of cases.

**Teeth Used
as Abutments.**

In the second class, where the tooth is to serve as an abutment for bridgework, I am unreservedly and more strongly inclined to devitalize the pulp. In such instances, especially where the tooth is perfectly sound, more grinding is necessary in the mechanical preparation, and greater shock is consequently induced; the open ends of the tubuli thus denuded of the protection of enamel are exposed to the irritating action of the cement; the pulp is deprived of its normal external influences in being so isolated by the non-conducting properties of the intervening mounting material; the tooth is held as if in a vise and consequently deprived of the natural mobility afforded by the cushion of membrane surrounding it, and greater stress is imposed upon it. If the possibilities of irritation resulting from all other causes were not apparent, the continued unnatural influences of immobility and stress are great enough, in my opinion, to induce a degree of irritation which will usually terminate in the ultimate death of the pulp from strangulation and stasis.

Further, if the mechanical requirements in connection with properly preparing such teeth are carefully and conscientiously observed, so that a close adaptation of the crown to the neck of the tooth is made possible, it usually becomes necessary to sacrifice so much tooth structure that the patient is subjected to a most excruciatingly painful, and, in many instances, even brutal, ordeal.

Conditions of age, however, may occasion feasible exceptions in single crowns, because of the difficulty, in early life, of perfectly filling the canals, due to the incomplete development and enlarged foramen; and, in old age, to their frequent obliteration as a result of the gradual atrophy of the pulp and the formation of secondary dentine. These latter physiological phenomena only strengthen the argument of the cessation of function of the pulp with complete development of the tooth, and the belief that subsequent disintegration is no more likely to occur after the removal of the pulp than before, providing the canals are properly filled. The difficulty of accomplishing the latter with a reasonable degree of certainty and perfection should be no excuse in view of the modern aseptic means available.

Another exception may sometimes be made where, because of the natural shape of the tooth, or the absence of adjacent or occluding teeth, much grinding will be unnecessary, and the artificial substitute is not carried beneath the gum, both of which greatly diminish the probabilities of irritation.

**Open Faced
Crowns.**

The practical value, use and abuse of the so-called window or open faced crowns is a question of material importance and significance, because of the fact that from their application one of two conditions

must result. Either *less* destruction of the natural tooth will become necessary than for any other style of crown, or means of attachment, or *greater* destruction will accrue from their use.

Without question, or doubt, one of the greatest *curse*s to the success and practicability of modern bridgework has been occasioned by the indiscriminate and unskillful use of such so-called crowns or bands, for the attachment of artificial teeth, and more *good* natural teeth have been lost, and more failures recorded than can be directly attributed to any other one cause.

From my experience and in my own work I condemn the general application of such devices as being inartistic, injurious to the conservation of the tooth structure supporting them, and a menace to the permanency and success of the bridge of which they form a part.

Yet, while this is *generally* true, there are instances where such crowns *may* be useful and serviceable if *properly* constructed and adapted.

If their application be confined mostly to the cuspid and lower incisor teeth, or where the normal shape of the natural teeth is favorable; if the approximal walls of such teeth are then properly paralleled and their proportions sufficiently reduced to afford opportunity for the accurate adjustment of a *crown* and not a *band* to the remaining tooth; if the fit is close at the neck, and the entire lingual surface and occlusal end covered, and the edges all brought to a position in relation to the labial surface of the natural tooth, which will make them self-cleansing, and the crown is then built strongly by sufficient and uniform re-enforcement, even at the expense of grinding the opposing teeth, if necessary, such an attachment may be found useful and reasonably permanent.

They may be useful and practical when *all* of these requirements have been observed, because of the fact that their application does not necessitate sacrificing the natural crown to the gum line. This fact renders possible the obtaining of greater strength in the attachment of the crown to the tooth, which is often essentially desirable in long bridges, where these abutments will be subjected to much stress.

Particularly is this so in the lower anterior teeth, where to preserve the natural crown will often increase the strength of the attachment by distributing the leverage and stress, and where to destroy or sacrifice it would often mean to weaken the attachment or to lessen the possibilities for securing the greatest degree of integrity. This also frequently holds good in the lower cuspid teeth when they are used to support more or less extensive work.

In the construction of such crowns for those cases in which they seem indicated, it is desirable to make them of a grade of gold sufficiently soft to be easily and closely conformed to the tooth, and when this

adaptation has been secured, the *required* re-enforcement and *uniform* stiffness can then be best made with small pieces of thin clasp metal laid on the surface consecutively and attached with small bits of high grade solder.

**Incising
Natural Crowns
of Sound Teeth.**

The question of sacrificing the natural crowns of sound teeth for the purpose of substituting artificial ones as a support for bridgework is unquestionably a most important one, and demands the most conscientious thought and deliberation, for the reason that it is not within the province of "art" to *perfectly* reproduce nature.

It is my opinion, however, that such a procedure becomes warrantable in proportion to the disfigurement caused by the missing teeth; the normal or abnormal position of such natural crowns in their relation to the adjacent teeth; the absence of practical indications for other or better means of supplying the missing ones than by bridgework; the inconvenience occasioned the patient in the wearing of a partial denture; their natural abhorrence of the same, or the possible injury to the natural teeth that might result from abrasion, in the use of the latter, and the ability of the operator to restore them in a practical, artistic and reasonably permanent manner.

While the age, and possibly the sex, of the patient has a material bearing upon the practicability of such a course in any event, I am of the opinion that we may often be justified in adopting such a procedure in at least two general classes of cases.

First, in those cases where an extensive bridge may seem indicated, and where a permanent style of crown is employed upon the remaining abutment roots. If all other abutment roots were crowned in a manner which seemed to offer greater opportunities for permanency than would likely be secured by any other style or method of attachment possessing sufficient strength, I should not hesitate to sacrifice the natural crown of a tooth which was needed for support and substitute an artificial one, as a means of affording greater strength to the entire piece and more artistic and permanent results.

Second, in many of those not uncommon cases where *conspicuous* teeth have been lost, in an otherwise perhaps good and uninterrupted arch. By sacrificing the natural crowns of the tooth or teeth adjacent to the space, as the requirements may indicate, the missing ones may often be supplied, in a fixed or removable manner, by attachment to the artificial substitutes, with results more comfortable and serviceable, and less objectionable, inconvenient and embarrassing to the patient, and with artistic and permanent possibilities in proportion to the skill evidenced in the adaptation and construction of the work.

**Supplying Single
Anterior Teeth.**

Purposely transposing the last two problems as presented, I approach the question of supplying single anterior teeth with a degree of hesitancy, because I know of no problem quite so exacting, nor one demanding a greater degree of good judgment and mechanical and artistic ingenuity, than how we should, and can *best*, supply such missing teeth.

Indeed, you will agree with me in that there is no one universally *best* method. While many are employed, and each, no doubt, affords success, the indications, requirements and existing conditions of the individual case must govern the application and practicability of each.

If the missing tooth is a central incisor, it may be supplied in a practical and artistic manner by crowning the adjacent central and attaching it to the crown; and, owing to the conspicuous disfigurement, and the artistic possibilities in such cases, I am of the opinion that it is frequently warrantable to sacrifice the natural crown for this purpose, and that the best results may be often obtained thereby. A provision against the possibilities of rotation, however, should always be made in such instances, which should consist of a saddle upon the gum beneath the dummy, or a rest or support upon the lingual surface of the lateral. The advantages of the former will be referred to later, and the success and efficiency of the latter are entirely dependent upon its rigidity, and the small area of contact and self-cleansing relation it bears to the natural crown.

When the natural crown of the remaining central is sound, but that of the lateral decayed, or even filled, it may seem preferable to crown the lateral instead of the central. In such cases, however, owing to the disparity in the size of these teeth, and the stress imposed upon each, it would not be practicable, of course, to suspend the central from the lateral without some fixed attachment to the central. Such may be secured by means of a post and inlay or by the insertion of a filling in linguo-approximal surface of sufficient depth to admit of the subsequent formation of a seat for the accommodation of the projecting end of a platino-iridium bar. If the filling is well inserted and finished, and the slot for the end of the bar afterward cut of proper dimensions to engage it in a firm seating only, no effort need be made to anchor it more securely, and the slight mobility thus afforded is an advantage in these cases.

Another procedure of some practical usefulness where the crowns of the natural teeth may be preserved is to devitalize both adjacent teeth, and attach the missing tooth by means of a fixed post, or bar, and gold inlays in each. For anchoring such means of attachment the inlay seems to offer opportunities for securing a better adaptation to the cavity walls than it is often possible to secure by previously mounting with cement and

subsequently filling with foil, but the dissolution of the cement and the not infrequent tendency to ultimate discoloration may sometimes prove objectionable in such procedures. Wherever such procedures seem contra-indicated the use of plates covering the entire lingual surface may be sometimes preferable to the formation of cavities. In the application of such devices, however, *grooves* must be cut into the tooth or teeth as a means of affording sufficient mechanical fixation; the margins brought to a self-cleansing area; the adaptation perfect, and the re-enforcement adequate.

Missing laterals may be supplied by crowning the central or the cuspid, either of which will, of course, support them, if the provisions against rotation are observed; or, by adopting a combination of the other means of attachment suggested, when it seems desirable to preserve the natural crown. While many other methods may be used and advocated, these have proven the most reliable and successful in my hands.

**Use of the Saddle in
Permanent Bridges.**

With an appreciation of the importance of this particular problem, I have purposely deferred its consideration until the last, and shall beg your indulgence and permission to treat it in technical detail and at some length.

That which I understand to be generally designated as a "saddle" is the surface or portion of the work which is brought in contact with the tissues, and which is purposely intended to serve as a permanent, immovable rest or support, intermediate or adjacent to the roots acting as abutments for the work.

The usefulness of such a medium of support, *when indicated*, is, in my opinion, unquestionable and indisputable, but its efficiency increases or diminishes in proportion to the degree of accuracy obtained in the adaptation.

Let it be understood, however, that the *paraphrase* "when indicated" fully covers the question of its usefulness, because the use of such a device is often entirely unnecessary, and frequently contraindicated.

While some rest upon the tissue is invariably essential to bridge construction, the indications for the use of a saddle are governed entirely by the conditions existing, which should, of course, be carefully noted and studied, in order that the requirements of the case may be determined, and that the indications for the application of a *fixed* structure may be definitely ascertained as favorable.

Porcelain.

The use of the saddle, in my opinion, is indispensable in porcelain work, for the reason that the friable nature of this material demands that such portions of it as form masticating surfaces and are to be subjected to masticating stress must be protected and supported. As the strength of this

material increases in proportion with the bulk, as much as is consistent must be used in reproducing contour, and the saddle affords the only adequate means of supporting such reproduction; hence, from this standpoint, it makes possible the more permanent success of this work.

Its use is also indicated in extension bridges of **Extension Bridges.** gold or porcelain, where one or more posterior teeth possessing masticating surfaces, or subjected to masticating stress, are carried anterior or posterior to the abutment or abutments. In such cases the abutments *must*, of course, *necessarily* possess sufficient strength in themselves to afford ample and permanent support to the dummies, and the occlusion should be such as to throw a preponderance of the stress imposed, upon the roots supporting the work, but a proper rest upon the tissue will then enable the dummies to offer and sustain a degree of resistance sufficient to make them comfortable and serviceable. If such a condition is not obtained, and the work assumed by the dummies is thrown entirely upon the abutments, it is but natural to expect the destruction or displacement of the piece or the ultimate loosening and loss of the roots.

In those cases where the position of the opposing natural teeth, or the absence of some of them, necessarily throws the *greater portion* of the stress of mastication *upon the dummies*, and perhaps even precludes any occlusion of the abutments, a rest upon the tissue beneath the area of greatest stress is indicated. The relief thus afforded the abutment roots, especially where the span is a long one, and the additional strength given to the piece at its weakest point will often admit of the practical and permanent application of stationary work, which would otherwise prove a failure.

While granting that *theory* and *practice* are sometimes but distantly related to each other, yet, contrary to the generally accepted belief in the unhygienic condition usually afforded by a saddle, such a device, I think, is sometimes indicated, in order to secure a closer approach to a hygienic result.

The Saddle as a Hygienic Measure. In cases, for instance, where the occluded surfaces of the opposing teeth in occlusion are in close proximity to the tissue in the space to be bridged, a condition commonly called a "close bite," and where the dummies to be supplied must possess a masticating surface in order that such a bridge may be serviceable as well as ornamental, the use of a well-adapted saddle will result in a far more hygienic condition than the lingual shell formed by the attachment of the cusps to the facings.

While in such cases the cusps should not be large bucco-lingually, and the lingual surface of each dummy always favorably contoured, if

possible, the surface of a bridge brought into close contact with the tissue will often be found far more hygienic than the absolutely inaccessible receptacles resulting from the usual method of construction. In this connection the surface of a well-adapted saddle, and the possibilities for gum reproduction and lingual contour afforded by it, will often render the work cleaner and more comfortable to the patient than the ordinary construction, which with every favorable opportunity is often neglected, or impossible for even well-advised and usually scrupulously diligent patients.

Whatever merit and advantages a saddle may possess, and however useful it may sometimes prove, there are, however, conditions contraindicating its use quite equal in importance to those indicating it, and which must be observed even more closely in order to preclude the evil results of an unnecessary, unwise and injudicious application.

In bridges extending anteriorly to the second **Contraindications.** bicuspid it is often practical to carry one dummy, where no masticating surface is necessary, without any support upon the tissues beneath it. In such cases, however, the abutment from which it is extended should possess sufficient strength and should assume a preponderance of the stress imposed.

The saddle is also unnecessary, and consequently contraindicated, in those typical cases where the abutment roots are close enough together and sufficiently strong to withstand the stress assumed by the entire fixed structure; where the occlusion is favorable, and where every opportunity is afforded for the abundantly self-cleansing contour of the lingual surface.

Such construction is also contraindicated in all cases where thorough and complete absorption of the tissues has not taken place. If this is not observed the subsequent absorption will not only destroy the usefulness of the saddle, but will result in the presentation of a decidedly unhygienic condition.

As the success of the saddle is so dependent upon a proper and sufficiently close adaptation, it is, of course, always contraindicated whenever and wherever every facility is not, or may not be, employed to secure and sustain such relation.

A consideration of the requirements must begin **Construction of Saddle Bridges.** by specially emphasizing that its "success and usefulness increase in proportion to the accuracy of its adaptation." It must fit the tissue perfectly and must rest upon it with uniform pressure at all points sufficient to afford relief to the abutments, and to preclude the infiltration of food-laden secretions between it and the tissue upon which it rests; yet not sufficiently hard to cause capillary stasis, or to induce reabsorp-

tion. In size it should be no larger or cover no greater area than is absolutely essential to the work to be assumed by the teeth it is intended to support, and the edges should be *rounded* and *smooth*, so as to afford no possible irritating influence. It should also be made of a metal which is least susceptible to the chemical action of the secretions. For this reason the use of platinum is universally indicated, because, aside from its manipulative qualities, it is least affected when subjected indefinitely to such action, and, in consequence, will more permanently retain its color and lustre, and remain cleaner than gold of any degree of fineness.

The importance of adaptation has already been mentioned, and while various methods of procedure have been suggested and employed as a means of obtaining this, it is usually accomplished with difficulty and uncertainty. The following method, however, will overcome any obstacles and insure a degree of certainty and accuracy which will add much to the practicability, serviceability and cleanliness of the saddle. The abutment caps or crowns should first be completed and adjusted to position on the roots. An impression of them and the intermediate tissue should then be taken with plaster. If the crowns are withdrawn in the impression on removing it they should be detached and laid aside for the present. The open ends of the impression should then be filled in with moldine or plaster, and, if necessary, the whole may be built up or extended sufficiently to give adequate body and strength to the die. After drying, the die should be secured with any fusible alloy, and will present a perfect reproduction of the abutment crowns in position and their relation to the tissue upon which the saddle is to rest. This should then be built up, as suggested, in order to form a matrix for the counter-die, in which it is only necessary to leave the surfaces of the crowns presenting toward each other and the intermediate ridge exposed. After dusting the surfaces with lycopodium, which I have found to prove the best and cleanest separating medium, the counter-die may be easily secured of the same alloy. Thirty-two gauge platinum, or platino-iridium, if stiffness is desired, should then be swaged and trimmed to the required form.

The shape and conformation of the tissue upon which the saddle is to rest, and the size of the dummies to be supported, should guide in the shape and form given to it. In broad, flat ridges the saddle should be proportionately larger, of course, than in thin, sharp, narrow ones, the usual width varying from three to five-sixteenths of an inch. When the wider saddle seems indicated, however, it is usually best to leave it full width immediately beneath the dummies only, by cutting it away to some extent in the interproximal spaces. Such a shape affords opportunities for sufficient support and lingual contour beneath the dummies, and, especially in gold work, less conspicuous and possibly cleaner interproximal spaces.

When properly swaged and trimmed, the crowns should be adjusted to the roots and the saddle finally adapted in the mouth. Each end should be trimmed so as to come in direct contact with the crowns *when pressure is applied*, and the edges should not be allowed to lap over upon them, as such a joint would destroy the assurance of accuracy of adaptation at this vulnerable point. It now becomes necessary to preserve an absolutely accurate relation between tissue, saddle and crowns, until the same is permanently sustained by soldering. This can be accomplished by securing an impression of the parts in position, in plaster, *with sufficient pressure upon the saddle* to insure a bearing upon the tissue, which will enable it to afford support and offer a resistance to the stress imposed. This may be secured by the use of a prop of orangewood, of suitable length to keep the mouth open, with one end resting upon the center of the saddle and the other against the opposing teeth or ridge. With this so adjusted, and a firm closure upon it, the saddle is gradually and gently forced into the tissue, when the impression can be taken *without relieving the pressure*. For this purpose an ordinary partial impression tray similar to S. S. W., No. 30-31, is used, with a slot cut into it from the heel sufficiently wide to accommodate or *straddle* the prop, so that when filled with plaster it may be easily carried to place. By such means a uniform pressure is secured and sustained, as can be done in no other manner, and the accuracy of adaptation is proven by the fact that the plaster never penetrates beneath the saddle in taking the impression. This idea is a modification and more practical application of the suggestion of Dr. W. E. Griswold.

When the impression has been secured it should be filled with investment material, which, after separating, will admit of the permanent attachment of the parts with solder. The piece should then be replaced in the mouth and the bite and final impression secured for the completion of the work.

These props may be cut in various lengths to meet the requirements, and may be made applicable, where there are no opposing teeth, by covering the end which rests upon the tissue in such cases with a cushion of modeling compound or sealing wax.

In the mounting of fixed bridges when a saddle is used, the employment of gutta percha is always indicated, because of the extreme difficulty encountered in preventing the surplus cement from flowing in between the saddle and tissue, which, after crystallization, offers a constant source of irritation, often most conducive to troublesome and unpleasant results.

Such accident may be remedied, however, by previously placing a piece of unwaxed silk floss over the ridge, which, after mounting, and with the teeth held in firm contact, may be carried backward and forward

until much of it is removed. Yet, with close adaptation this is necessarily somewhat painful, and such a requirement may be entirely overcome by using gutta percha, aside from its other advantages.

The question very naturally arises as to just what condition the tissue under such circumstances may ultimately present, and what, if any, physiological change or pathological disturbance will occur. Time alone will answer this, but an extensive observation and considerable experience has so far indicated a favorable prognosis.

Upon the removal of several such bridges worn from three to five years, where the adaptation had been good, the surface of the saddle was found clean and comparatively free from accumulations, excepting some little exfoliated epithelium; the patients had experienced no particularly unpleasant taste nor offensive odors, and the tissues, while presenting a slightly reddened, somewhat congested condition, due perhaps to a *superficial* capillary stasis, as a result of the pressure, indicated no marked evidences of soreness, inflammation, hypertrophy or resorption.

Such results could only be expected, however, where a good, close adaptation and no irritating influences existed. To reiterate, the success of crown and bridge work, in any of the various phases of its application, is, and always will be, dependent upon and coextensive with the observation of three cardinal principles: *Conservatism* in method of procedure, *judgment* in application and *skill* in execution.

The Ethics and Prosthetics of Crown and Bridgework.

By FREDERIC A. PEESO, D.D.S., Philadelphia, Pa.

Read before the Second District Dental Society, Brooklyn, Jan. 13, 1902.

In response to the invitation received from the chairman of the committee, I have attempted to answer a portion of the questions sent to me and take up the first for consideration. It reads as follows: "Is it warrantable to crown a tooth or root having a living pulp, without first removing the pulp, especially where the root is to be used as an abutment for a bridge?"

**Crowns on Teeth
with
Living Pulp.**

The advisability of setting a crown on a living tooth has for years past been widely discussed, but the question seems as far from being settled now as when first started. There is much to be said both for and against, and strong arguments are advanced by both sides. Some go to extremes and say that the pulp should be removed in every case before placing a crown; others are equally certain that it should always be preserved.

It is unquestionable that in some cases the irritation of the cement, used in setting a crown, on the dentine of the tooth may be detrimental to the health of the pulp, but in a great many instances the injury to or the death of the pulp can be traced to other causes, among which are malarticulation, improperly prepared teeth and roots and poorly fitting bands. There can be no doubt that any of the three causes named may set up an irritation that will eventually result in the death of the pulp or the loss of the tooth itself.

Referring to my own experience, I will say that for some years during the early part of my practice I considered it all important to preserve the pulp, however sensitive the tooth might be or whatever suffering the patient might have to undergo both in grinding it down or in cementing the piece in place. If the teeth were very sensitive, of course I felt sorry for the patient, but said he would have to grin and bear it, however painful it might be. I do not know of a single instance where I have had cause to regret preserving the life of a pulp. One case I will mention which may or may not have resulted from capping a vital tooth.

**Case from
Practice.**

Ten years ago I placed a lower left bridge of four teeth in the mouth of a lady, using as abutments the first bicuspid and second molar. She was wearing an upper plate, the teeth of which had been ground in articulating, and their surfaces were somewhat roughened. Last spring she came to me and complained of the molar being sensitive. On making an examination I found that in one place the cusp of the molar crown was worn through, exposing the dentine where the natural cusp had been ground away in preparing for the crown. I removed the piece by slitting both caps and repaired it. The tooth was so tender that I did not replace it at once, but covered it with a gutta-percha cap and waited a few days, at the end of which time, the condition not improving, I concluded to devitalize it. After applying the rubber dam I made a slight exposure of the pulp, using chloride of ethyl while drilling, and applied a local anæsthetic with pressure. On opening the pulp chamber I found a large pulp stone. I removed the pulp, cleansed and filled the canals and reset the bridge, which has been perfectly comfortable ever since. The patient

had had no trouble with the piece until a short time before I removed it, and then only a slight tenderness and sensitiveness, which at the time I supposed to be caused entirely by the cap being ground through and exposing the dentine.

In this case the trouble may have been caused by placing a crown on a live tooth, but I am not at all certain that it would not have been the same had the tooth never been crowned. At any rate the piece was perfectly comfortable and satisfactory for ten years and is so at the present time.

**Second Case
from Practice.**

In April last a lady came to me having in her mouth a bridge which had been in for some time, but had never been comfortable. It was anchored to the superior first bicuspid and first molar, carrying a bicuspid dummy and a cuspid and lateral extended. It was the second or third bridge that she had had, but none of them were satisfactory, the two abutments seeming to be in a constant state of irritation. I removed the bridge and devitalized both bicuspid and molar. In the bicuspid I found a good sized pulp stone. The teeth had not been trimmed nearly as much as they should have been; in fact, the enamel had not been removed, and there could have been no direct irritation to the teeth from the cement, but the gum was highly inflamed. After the teeth had been trimmed the bands were almost a quarter too large for them. The articulation, too, was poor, and that, together with the irritation of the bands and cement to the surrounding tissues, was enough to cause trouble which would not have been prevented had the teeth been devitalized at the beginning.

It has been my experience to meet with a good many cases similar to the one just described, but in none of them do I think the trouble due to the crowning of a live tooth. In some I have placed bridges, without devitalizing, which have been in for years and are still doing good service.

Where teeth had become so elongated, or their position was such that their preparation would necessitate the exposure of the pulp, of course I devitalized them. As time passed I found that the teeth from which the pulps had been removed were doing just as good work and giving the same satisfaction as those with vital pulps; hence I came to the conclusion that the pulp was not necessary to the longevity of the crown or bridge.

Should a tooth with a living pulp, which has been crowned, at any future time give trouble, there is nothing to prevent its being treated the same as any other tooth without removing the crown. It can be opened through the cusps, and after treatment the cavity can be filled with gold.

Where a tooth is not sensitive or only slightly so, and can be ground to the desired shape with very little pain to the patient, I think it perfectly

justifiable and advisable to preserve the pulp, but where it is extremely sensitive and tender it would be inflicting needless torture on the patient to prepare it as it should be prepared without first removing the pulp and filling the canals.

Of the different methods of doing this I will not speak, other than to say that the pulp should be anæsthetized and removed without the use of arsenic and the canals filled at once. Arsenic should never be used where it can possibly be avoided.

In many cases the removal of the pulp is of positive benefit to the tooth, and where a tooth is somewhat loosened I should advise its removal before crowning. It has probably been the experience of most dentists at some time to have found teeth with living pulps which have become very much loosened, where scaling and treating seemed to have no beneficial effect, but on removing the pulps and filling the canals the teeth have become quite firm, sufficiently so as to serve as abutments for bridgework.

On the other hand, I have seen one patient during my practice whose mouth would hardly tolerate a dead tooth. In almost every case, as soon as a pulp was dead or removed, the tooth loosened, and nothing that could be done would cause it to tighten in the least. This was not only in teeth which I devitalized, but in those which had been devitalized by others. Five or six years ago I placed two removable bridges in her mouth, extending from the cuspids on the upper jaw to the first molars on either side. On the molars were telescope caps, and on the cuspids caps with tubes and split pins. On the two lateral roots I put Richmond crowns. The two bridges are somewhat loosened, but are still doing very good service. The laterals are a little loose and have elongated nearly one-sixteenth of an inch. The molar on the right side has a living pulp; that on the left was devitalized. The condition of both teeth seems to be the same.

She is the most peculiar patient I ever saw, unless I except her daughter. With them the unexpected always happens, and everything is different from what it is with any one else.

Evils of Malarticulation. Malarticulation may cause trouble which in many cases is set down as the result of capping a live tooth. I think you will find very few crowns or bridges that are properly articulated, nor do I claim perfect articulation for all the work that I put in, but the articulation should be such that no undue strain will be brought to bear on the tooth crowned or upon the abutments, especially laterally, as it will surely loosen the tooth and is very apt to react on the pulp. In every case the articulation should be made as nearly normal as possible, and should the occluding teeth be elongated they should be ground enough to secure the desired result. If necessary they should be devitalized and crowned. Aside from over-

coming any possible irritation the work in mastication is rendered of far greater value if the articulation is correct.

Giving a tooth too much to do is another thing which may act injuriously on the pulp. By properly preparing a tooth and properly articulating the piece, a tooth may be made to do far more work than it was originally intended to do, but if too much is expected of it there is sure to be trouble. Ordinarily a bridge of four and occasionally five teeth may be safely placed on two abutments, but judgment must be used as to when and where to put them. A longer bridge can be placed in the lower jaw if the patient is wearing an upper plate, and the same in the upper.

The preparation of the teeth and roots is by far the most important thing to consider in the placing of a single crown or a bridge, and if this is properly done, the bands accurately fitted and the articulation correct, the question as to whether or not a tooth has a living pulp is of secondary importance, provided if living it is healthy. If a tooth is not properly prepared I do not think it is possible to fit the band accurately at the neck. The result is that it cuts into the gum; the cement presents a rough, jagged surface to the soft tissues, eventually setting up an irritation which may be communicated to the pulp and necessitate its removal, but the trouble under these conditions will not end with its removal, nor will it be improved. To properly prepare a tooth the contour must be entirely removed so that the sides are nearly parallel or the tooth is slightly larger at the neck, about one-sixteenth of an inch below the gum line. If this is done in every case and the bands are accurately fitted, I think the work will prove satisfactory whether the tooth has a living pulp or not.

It is a question for which no cast-iron rule can be made, but each case must be decided on its own merit. In bridge work, as in other operations in the mouth, whatever is done must be done carefully and thoroughly. In the preparation of abutments too much care cannot be given. It takes time to grind a tooth to the proper shape for the reception of a crown, and this time must be given if we are to do justice to our patients and ourselves. Anything that is worth doing at all is worth doing well, and if there is not time to do it as it should be done; better not do it at all.

I may seem egotistical, but I have made a careful study of the subject and have been, I think, unusually successful in my operations, and my experience will warrant my speaking as I do. Others may work along the same lines with different results, and each must decide for himself what is for the best in a given case.

**Open Faced
Crowns.**

"Is it warrantable to use window or open faced crowns, especially where the teeth to be crowned are sound?"

Generally speaking, the half-cap or open faced

crown should not be used in permanent work. As it is generally made it is very short lived and requires constant watching to see that it does not work loose, and if it does to promptly recement it. Here again the permanence of the work depends entirely on the proper preparation of the tooth, which should be trimmed so that there is no strain on the narrow band at the labial or buccal face of the tooth. I do not think they should ever be used, except on bicuspid, cuspids and lower incisors.

In preparing for any of them the sides must be made nearly parallel and the swell removed from the palatal or lingual side of the tooth, leaving the labial face intact. In the bicuspid the inner cusp should be ground off to the center of the tooth, leaving it longer on the palatal side and the restored cusp carefully fitted. With the cuspids the enamel is ground on the palatal side and a groove cut across the tooth just above the basilar ridge. The band is cut out front and back, thin, pure gold or platinum burnished into the groove and up over the back and edge of the tooth between the cap and filled in with solder, restoring the contour. In the lower incisors the lingual side of the tooth is ground and the tip cut off, leaving it high on the lingual side and sloping downward and outward toward the gum. The ears of the cap are made high and the thin, pure gold burnished up the back and over the beveled edge to fit closely. A piece of gold to restore the height of the tooth is placed between the ears and the whole waxed and soldered. With teeth trimmed in this manner it is impossible for the crowns to be forced inward, and there is no strain on the narrow band at the labial side. In any of these caps the band should be doubled on that side.

It is not often that I make use of the half cap, but within the past few months I have seen two of such bridges which I put in several years ago. One was an upper right, with a full gold cap on the second molar and a half cap on the first bicuspid. It has been in place for more than eleven years. The other was an upper left, full gold crown on the first molar and half cap on the cuspid. This was put in the mouth in November, 1893. Both of these pieces are still as firm as when first put in the mouth and have never loosened. If half caps will do as well as this, I think their use justifiable, but as I said in the first place, their lasting qualities depend entirely on the manner in which the tooth is prepared.

**Cutting off
Sound Teeth.**

The question "Is it warrantable to incise the natural crowns of sound teeth in order to crown a root in bridge work?" I think can be answered affirmatively. Where the cutting off of a sound tooth makes possible the restoration of several, it is justifiable to do so. Of course it depends entirely on the case in hand. It is simply a question of sacrificing the one for the good of the many.

**Supplying
Single Anterior
Teeth.**

"How should we supply a single anterior tooth, the adjacent teeth being sound, especially central incisors?"

I will briefly describe the way in which I have frequently supplied these teeth, where it was not desirable to put in a small plate.

Where a central incisor has been lost I have devitalized the remaining central and opened up the canal from the palatal side large enough to admit a tube of about No. 12 gauge outside, the inside being full No. 14. In the palatal side of the lateral, just above the basilar ridge, a cavity is made, care being taken not to approach the pulp too nearly, and a thoroughly condensed gold filling inserted, which is afterward countersunk to admit the point of a spur. A pin the size of the outside diameter of the tube is inserted in the central, being left long, or bent at right angles to insure its coming away in the impression, and the impression and bite taken. After the model is run the pin is removed, and we have the exact position of the canal and countersunk filling. The facing is then ground in place and backed. The tube cut to the right length is inserted, a split pin fitted to it and bent sharply at right angles and around the tooth to meet the facing. A pin of No. 15 or No. 16 gold clasp wire is bent and pointed to fit the countersunk filling in the lateral, the other end joining the facing. The whole is then waxed, removed from the model and soldered, after which it can be replaced on the model, articulated and finished.

An easy way of making the tubes is to have a series of polished and tempered steel mandrils with rounded ends, running in size from small to large. I have half a dozen of them, numbered from one to six, No. 3 being about No. 14 gauge. If a tube for a central or cuspid is needed, take a piece of iridio-platinum plate No. 33 about half an inch wide, file the end to a knife edge, roll it around a No. 2 or No. 3 mandril and solder with pure gold, without using flux, first having removed the mandril. The next larger sized mandril, No. 3 or No. 4, is then driven through it and the surplus cut off and the tube rounded with a file. By rolling it a little under the file the mandril can easily be removed. For the floor of the tube cut a little piece of the same metal about one-eighth of an inch square, flow a little pure gold over it, catch one end of the tube in the pliers, rest the other end on the little square of metal and solder with the blow-pipe. Drive the mandril in again and file the end to shape. This makes a much better tube than a drilled one, as it is perfectly smooth inside and is much more easily made. To make the split pin take half round platinized gold wire, No. 14 gauge, bend it together and solder with coin gold from the open end as far as you wish the pin to be solid, and file or turn down the other end to fit the tube.

After the tube has been cemented the piece is removed, and with a very thin instrument the wire is spread just enough to make it bind a little. Being closed at the end, it forms a long, slender elliptical spring, and there is no danger of one side being broken off. In cementing, the tube is put on the pin and a little wax run around the edge to prevent any of the cement from getting in. It is then cemented the same as a fixed piece. After the cement has hardened the piece is removed, a little of the cement scraped away from around the top of the tube, a tightly fitting steel pin placed in it and filled around with gold.

This makes a good, durable fixture, and the discoloration of the tooth is so slight as not to be noticeable. A central and lateral may be restored in the same manner by putting a tube in the cuspid and resting the spur in a filling in the central.

In the case of a lateral I have often made use of the first bicuspid, both in fixed and removable work. In some instances, in fixed pieces, I have used a half cap on this tooth, swung a half round platinized gold band around the canine, just far enough away from the tooth to allow the bristles of the brush to pass in cleansing, and attaching it to the lateral facing and on the other side a spur resting in a gold filling in the central as already described.

With removable pieces I have made use of the telescope cap, combinations of this and the tube and split pin and porcelain faced crowns with the tube and split pin connecting with the lateral as in fixed work.

The Ethics and Prosthetics of Crown and Bridgework.

By Dr. WM. P. COOKE, Boston, Mass.

Read before the Second District Dental Society, Brooklyn, Jan. 13, 1902.

In the discussion of any subject that depends upon the patient for one part in the carrying out of any line of treatment, you have a condition that prevents the exact following of any rule.

This was brought anew to my mind by a question from a student who had a previous training as an expert machinist. He asked if in our crown and bridgework we had a method of procedure that would enable him to cut the root to a certain size and then adapt to it a band, previously fitted; in fact, what we had in the Buttner system.

The answer was that, while in his machine work he could be exact,

in dentistry we commence with a defective condition; that the ravages of decay make the crown a necessity; that if we could start with a perfectly sound tooth or root, we could use such a system; in fact, that with such conditions the majority of the known systems would give success. That because we are dealing with live tissue rather than lifeless matter, we are prevented from producing that exact work under all circumstances to which he had been accustomed. That as a recent writer very well puts it: "The operator puts the engine away when he well knows the tooth is not properly shaped to receive a cap."

So in the consideration of these questions I shall give what seems to me to be a general rule, as there are cases that call for special treatment, cases so controlled by the conditions of the patient that no rule can be applied to them.

"Is it warrantable to crown a tooth or root having a living pulp without first removing the pulp, especially when the root is to be used as an abutment for a bridge?"

**Crowning Teeth
with Living Pulp.**

If a tooth with a living pulp is better than a pulpless tooth, even though the latter has been treated and filled in the best manner, then I see no reason why the pulp should be destroyed in order to crown such a root, or to use it as an abutment for a bridge.

The objection that such teeth when crowned do not have the same blood supply as normally, as the gold with cement lining shuts off the effect of heat and cold, also the light, is more of a theoretical objection than a practical one.

Clinical experience counts in this case, and I remember but one case of either crowned or bridged teeth of this character that has developed an abscess as the result of a dying pulp. When it is possible, I always save the pulp alive when inserting crowns or bridges, and this includes teeth worn down by abrasion, and even when part of the crown has been lost by caries. I think most of the gentlemen present would prefer a tooth with a live pulp in their own mouths rather than a pulpless one, even though it was excellently filled.

The pulp is the formative organ. It is also the best medium of nourishment the tooth has, and unless it becomes a cause of pain to the patient its life should be preserved.

Some teeth are of such shape that they cannot be properly trimmed for a banded crown without such annoyance to the patient that the operation cannot be completed. Such cases furnish the exception to the rule. But in many cases where the grinding surface has been worn down by use, the pulp can be kept alive even when the surface is so sensitive that it cannot be ground, and the tooth properly crowned by so constructing

your crown that no space is lost between the occluding surface of the tooth to be crowned and the occluding surface of the tooth that opposes it.

As the object of this conference is to present the methods pursued in different sections of our country, I will say that in conversation with one who does the largest amount of crown and bridge work for other dentists he said: "I do not know of one man in Boston and vicinity who would prefer to remove the pulp before crowning the tooth."

Take that class of cases, of which we have so many, the superior bicuspid: these teeth that are the most difficult to preserve, and where caries finds its easiest victory. Many of these teeth, after having been carefully filled, present in after years, with the buccal wall missing and the fillings intact, the pulp alive. These teeth can be ground down and a banded crown with porcelain face inserted and the pulp preserved, and very little loss of dentine be caused. I see no reason why in this class of cases the pulp should die any more than under a proper filling.

If the root is to be used as an abutment for a bridge and has a living pulp, the question of destroying the pulp would depend upon the conditions. Simply because you wish the root for an abutment is no reason for destroying the pulp. If the root is strong and firmly set in the process, the pulp alive, because it has receded and thrown out new dentine, and you wish to band it and use it as an abutment, I would not remove the pulp unless I needed the root canal for anchorage, unless it was or had been recently inflamed or exposed.

I will cite one case to illustrate the treatment of this class of cases whether used for crowns or bridges.

Case from Practice.	Right superior first bicuspid; buccal wall, broken off; tooth had been previously filled with cement. Pulp alive. Palatal cusp shortened and inner wall ground to renew the contour. A band was fitted, soldered on the palatal side; a piece of pure gold was then soldered to the occluding end of the band, the pure gold stretching when the band is drawn to place, if there is any portion of the tooth that bears upon it. A cross pin cuspid tooth was ground to fit and the cutting edge beveled, so that with a pure gold backing, strengthened at the tip by adding a piece of clasp gold, the facing was secured against fracture and yet no gold showed below the edge of porcelain. The inner cusp was made of gold soldered on at the same time the facing was soldered.
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I have records of all metal molar crowns put on the upper and lower first permanent molars, the pulp being alive, inserted in 1889. The pulps are apparently alive today after thirteen years of service. Records of all metal bicuspid, pulps alive, bridge inserted in 1894; seven years and no trouble.

**Open Faced
Crowns.**

"Is it warrantable to use window or open faced crowns, especially where the teeth to be crowned are sound?"

Window or open faced crowns are generally used, but do better service when the narrow part of the band is strengthened. While this may not be the ideal method, it has the advantage of retaining the pulp alive, and when the tooth to be banded is shaped so that the band cannot stretch by use, they do very good service.

If the case is one in which some other method can be used, I should prefer it. If service is the most important point to be considered, the all metal crown is the best, but while this is admissible in some cases, its use farther front than the first molar on the superior maxilla is to be condemned.

Then you must choose between looks and strength with the tooth a superior cuspid. The cutting edge can be beveled on the palatal side in the same way that a facing can be beveled for backing, and your gold need not show on the labial side of the tooth.

The question calls for an opinion in cases where the teeth to be crowned are sound. This is better than when the teeth have been filled, as many open faced crowns have proved failures because they were put on over teeth weakened by caries. There is another reason for the failure of some of these crowns. The fit of the band is so poor that failure was a necessity.

In these cases where the teeth are so shaped that they must be very largely cut away in order to secure an accurate fit of the band at the cervix of the tooth, you will have more difficulty than in that class of cases that require little grinding. I am inclined to the opinion that when the tooth is to require an excessive amount of grinding, it is better to remove the pulp and crown in the ordinary manner.

In cases where I use an open face crown I usually cut a slot on the palatal side of the tooth, into which slot I burnish my pure gold top, and so prevent the stretching of the band.

The window crown that is simply a struck up crown with a small portion of the labial surface cut away, while the cutting edge of the crown shows gold, is not a warrantable procedure.

**Incising Crowns of
Sound Teeth.**

"Is it warrantable to incise the natural crowns of sound teeth in order to crown a root in bridge-work?"

This question is related to question one. The case must decide whether it is warrantable or not. In some cases one might extract a cuspid tooth, but we do not consider it a rule of practice to do so; so in this case, save your pulp alive if possible, but do not spoil

other more important portions of the work to save it. A cuspid or central in the case of bridgework, where it stands alone, would be better cut off, thus giving excellent opportunity for a good bridge.

In that class of cases where a tooth has elongated owing to the loss of its opponent, it is usually better to cut the crown off and give your patient the most useful bridge by so doing. If the tooth has pyorrhea alveolaris, it is an open question and decided by the case. While these cases do well when the pulp is removed, I have several cases that have done excellent service by being banded and being used as an abutment for a bridge, the pulp being left alive.

So for a general rule, when the case is such that by the incision of the crown a bridge can be put on that will look better, fit better and last longer than by retaining the crown of the tooth, I should incise it. In some cases I should do so when two of the above points are covered. I am of the opinion that we have been too conservative in the matter of cutting away the teeth and removing the pulps in cases that require bridgework.

One of the most satisfactory bridges that I know of is one that is constructed in such a way that it gives the patient all the benefits of a firm and permanent bridge and none of the disadvantages of a bridge permanently fastened in the mouth. By the use of gold crowns over which broad bands are fitted the firmness mentioned is secured, and by a small plate or bearing upon the gum the abutments are saved from being loosened, and the strain put upon them in the suspension bridges used fifteen or twenty years ago is avoided. The caps upon the teeth used as abutments prevent the decay that has ruined so many teeth that would have served their owners for years, when used as attachments for a partial gold plate.

"Should permanent bridges be made with or without saddles?"

**Should Saddles
be Used on**

Permanent Bridges?

We could spend the evening in discussing what should be considered a permanent bridge. From the patient's standpoint I am sure he would consider the bridge appliance permanent that did him the best service and lasted the longest. So in bridgework, where extensive bridges must be used, the appliance that will give the greatest service to the patient is the one to use.

While many have used an extension bridge that has secured its bearing upon the gum by a saddle, and have cemented the same firmly to the abutments, it seems that this method is open to many objections. When pressure is exerted upon these bridges, you must have the danger of leverage and the consequent loosening of your abutment, and while my observations lead me to conclude that most bridges do press upon the

gum and receive part of their support from that source, still this pressure is exerted without the principle of leverage coming in, and so the abutting teeth are saved.

To deliberately cover the gum with a saddle, and cement the bridge in place, is a method I have never used. Other means are available which are cleaner and open to fewer objections; still some men do use them; most do not do so.

Pressure causes absorption of the alveolar process. Even the slightest wire pressure, constantly applied, will move a tooth in orthodontia cases, and if you insert a permanent bridge with pressure enough upon the gum to prevent leverage upon the abutments, you will have irritation of the gum and absorption of the alveolar process. If it does not press upon the gum enough to prevent leverage, you will have the strain upon the abutment. This applies to that class of cases called extension bridges.

In regard to those cases that have an abutment at each end of the saddle, the condition is different and much better for both gum and abutment, as you have uniform pressure upon the gum, which is better for the gum and also relieves the strain upon the abutment.

I have seen several bridges with a partial saddle with the porcelain portion made of the Ash tube teeth. In these cases the saddle pressed upon the gum, and the cases were doing good service.

This becomes a question of clinical experience, and if you follow the tendency in the profession, you will find that some system that offers the excellencies of bridgework and the possible cleanliness of a gold plate, as in the Griswold bridge, is the one that the best men are seeking.

Supplying Single the adjacent teeth being sound, especially central
Anterior Teeth. incisors?"

This question is one that has caused serious thought to every man who has had such a case. A thoughtless and careless operator, one who does not give his patient an artistic result in his operations, because he has not the ability to see such a result in his imagination before he begins, may pass lightly over such a question, but one who has found by experience that he cannot easily replace a natural tooth in a natural manner will hesitate before he tells you *the* way to replace a superior central incisor, the remaining incisor being a sound tooth.

The first man of whom I asked this question said, "A small plate," but as this is far from ideal, we must look further. The pin and plate bridge is an excellent method of restoring such a case on paper, but the retention needed cannot be safely secured in many cases, as you must drill directly towards the pulp.

Extension bridges, with the abutment a bicuspid, are so faulty in

mechanical construction, and so clumsy for the patient, that their use is to be avoided.

The crown that seems to be the best one for such cases is the "staple crown," as suggested by Dr. F. L. Marshall of Boston. It is a modification of a crown brought out by Dr. Carmichael, and is described in *The Dental Cosmos* for July, 1901, page 779. Dr. Marshall has put on some three hundred of these crowns in the past six years, and has had no failures from the crown itself. The retention is secured by the drilling of a groove at such a distance from the pulp that the probability of irritation is remote. The close adaptation of the pure gold backing to the surface of the abutment prevents decay, and the platinum iridium wire, which is fitted to the groove, gives a secure anchorage.

A porcelain dummy is made from high fusing body and carved for the case, with the cutting edge beveled, so that the edge is protected by the gold and yet does not show the gold. This dummy is carved to fit the gum and presses evenly upon the gum. The relation between the dummy and the abutment crown can be taken with plaster with the parts held in the proper position in the mouth.

Conversation with other practitioners brought out the fact that several men had used the "staple crown," and that they were doing excellent service. I should prefer to use this crown if there were some risk of the pulp dying rather than to incise the crown.

The Articulation of Artificial Teeth.

By A. DE WITT GRITMAN, D.D.S., Philadelphia, Pa.

Read before the Southern Dental Society of New Jersey, Feb. 19, 1902.

As you well know, the proper articulation of the teeth is an important factor in the satisfactory use of artificial dentures, and, moreover, it does not always receive the consideration which it merits.

If the movement of the mandible in mastication were vertical like a hinge, the matter would be quite simple; but, it so happens that the temporo-maxillary articulation is one which affords a variety of movements.

The three essential ones are, first, the ginglymoid or hinge-like motion. Second, the protrusive or incisive movement, as in biting off a morsel of food. Third, the lateral or grinding movement.

We imitate the natural teeth in size, in shape, in shade and in arrangement as far as the æsthetic part is concerned, and right there the large majority of dentists stop.

Now, we know that the using of a full upper and lower denture is a mechanical operation, and unless the arrangement of those teeth is based upon mechanical principles, the patient will not obtain the maximum comfort from them.

**Articulation of
Natural Teeth.**

As to the normal articulation of the teeth themselves, the bicuspid meet so that the vertical axis of the second bicuspid of the lower jaw, passes between the approximal surfaces of the upper bicuspid, the lower bicuspid being (from the comparative narrowness of the lower incisors) just half a tooth in advance of the upper ones.



Fig. 1.

The articulation of the incisors varies; as in some instances their cutting edges come in contact when the jaws are closed, while, in other cases, the lower incisors pass upwards behind the upper. This is known as the "overbite," and, in extreme cases, the lower teeth will touch the gum, and when this occurs, the back teeth will be separated when the edges of the incisors are brought together, as in biting off a morsel of food.

The bicuspid and molars are provided with cusps; or slanting surfaces, which lock together when the jaws are closed, and, which can be brought together with a sliding motion when the mandible is moved laterally. The length of the cusps varies from front to rear. The first bicuspid has the longest cusps, and the third molars the shortest; but, when the mandible is thrown to one side, it is because the condyle on the opposite has moved forwards on the *eminencia articularis*, and, in so doing, it has descended. This would leave the teeth on that side out of contact, if it were not for the fact that the articulating surfaces of the teeth in typical cases never form a horizontal plane. They are always

set in a curve, and the horizon of the plane of occlusion forms a double curve, the molars rising so that they form a surface considerably inclined; and when the articulation is normal, the degree of this curve will be greater in proportion to the length of the cusps of the teeth. So, when the condyle swings forward, the separation of the molars on that side, consequent upon the downward movement of the condyle, is compensated by the curve of the articulating surfaces, and the molars and the bicusps of both sides can be brought into contact during a lateral movement.

The artificial teeth with which we are supplied do not, as a general thing, have very deep cusps, and their articulation will, of course, differ somewhat from that of the natural teeth, but there are still some points which are too often neglected, to which I will draw your at-

**Articulation of
Artificial Teeth.**

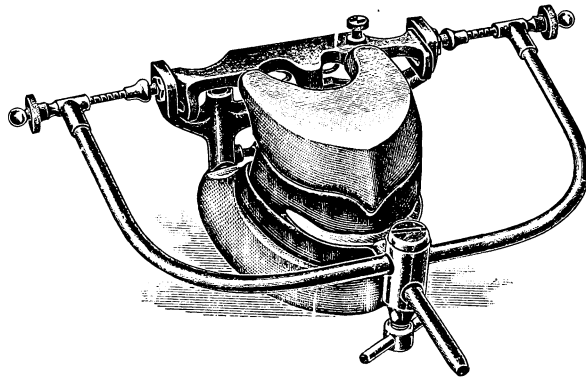


Fig. 2.

tention. First, the width of the teeth used. They should be of such a width that the bicusps will articulate properly. That is, to say, so that the vertical center line of the lower second bicuspid will pass between the superior bicusps. Then the teeth lock together, and there will be no tendency in the plate to slide during mastication.

Second, in full sets of teeth, any great degree of "overbite" should be avoided; and the articulation should be such that when the incisors are brought into contact, the second molars should also touch. This prevents the dislodgement of the plates. Then, when the mandible is moved laterally the teeth should be so arranged that those on both sides of the mouth can be brought into contact. But how is this to be done? The great stumbling block in the way is in the unscientific construction of the articulators in common use, but few of them making any pretension

to imitating any movement of the jaw, except such as could be imitated by a common hinge, and it is but seldom that any account is taken of the importance of placing the cast in the articulator so that the joint of the articulator will occupy the same relative position to the cast, as the maxillary joint does to the alveolar border of the patient.

**Bonwill
Articulator.**

In many articulators, the cast will be placed half an inch, or more, too far from the joint, and it is not usually the case that the latter is of the proper height.

The late Dr. Bonwill is entitled to the credit of being the first to devise an articulator which would meet the requirements. He found, by actual measurements of a large number of skulls, that the average width of the mandible, from center to center of the condyles, was

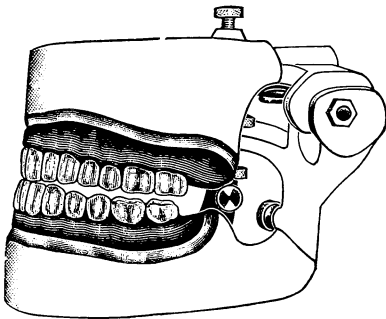


Fig. 3.

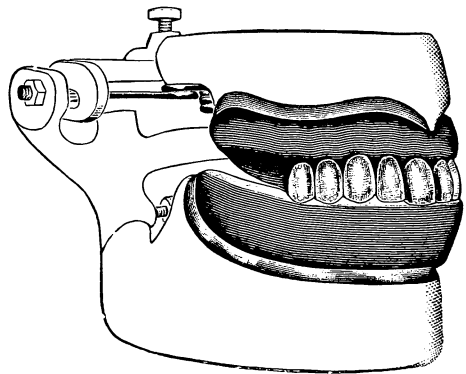


Fig. 4.

four inches, and, that the distance from the center of the condyle to the median line at the cutting edges of the lower incisors was also four inches as an average, thus forming an equilateral triangle, and he invented an articulator which is now in common use which embodied these proportions, and which also was capable of imitating the forward movement of the mandible at the condyles.

But this is only the average measurement. All jaws are not alike in dimensions, and it would be quite as likely that the measurement would be incorrect for any particular case as that it was right; moreover, this expedient only located the mesial line in front; and it will be seen, upon reflection, that it would be possible to swing the casts sidewise, or, up or down, at the rear, without there being any possibility of detecting the error. The correct placing of the casts was, therefore, in this way, largely a matter of guess-work.

**Dr. Snow's
Instrument.**

Dr. Snow has devised an instrument by which the actual position of the upper jaw for each particular case can be correctly located. This consists of a stem, for attachment to the upper trial plate, and a bow movably attached to the stem, which extends around the face of the patient, and carries pointers which can be placed directly over the centers of motion of the mandible; these points being about half an inch in front of, and a trifle below the floor of, the auditory meati. (Fig. 1).

The apparatus being firmly clamped in this position, it is removed with the trial plate, and transferred to the articulator. The pointers have

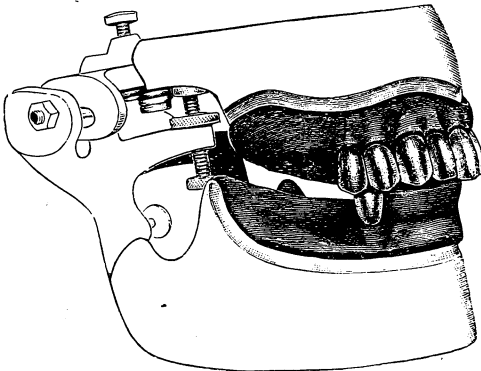


Fig. 5.

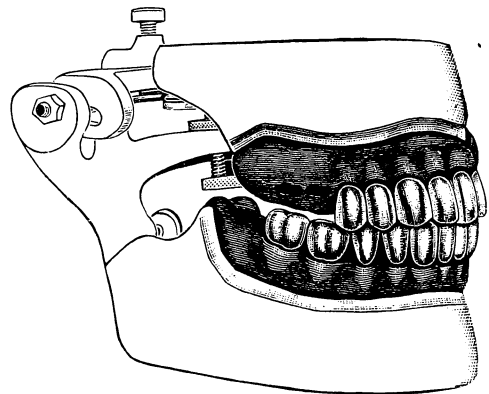


Fig. 6.

sockets which receive the tips of the bolts which form the joint of the articulator, and the two fixtures are thus joined together, and, it will be seen that its position must be anatomically correct beyond a peradventure. (Fig. 2).

**The Grilman
Articulator.**

To go with this instrument, an articulator has been devised following the same proportions as the Bonwill, but, providing for the average descent of the lower section, as ascertained by experiments, upon numbers of individuals; also, an adjustable model support.

There is still another point, however, that it not provided for—that is the adjustable extension of the articulator, to meet the varying widths of mandibles, from condyle to condyle that we have to deal with.

While I was associated with the Buffalo Dental College, the question of extension was discussed, and, on account of the necessary complication, and additional expense of articulator, it was for the time abandoned.

Dr. Kirk has called my attention to the imperfect construction of the articulator in this particular, and I hope it will be corrected in the near future.

Fig. 3 shows a full upper and lower denture that was transferred from the patient's mouth to the articulator with the facebow, so that it is anatomically correct.

This full upper and lower denture was articulated on a hinge action articulator. The patient tried for many months to wear these teeth, but failed to do so with any degree of satisfaction.

When the teeth are in position, the articulation is fair, but in ar-

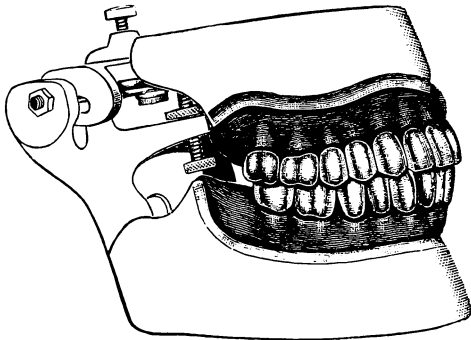


Fig. 7.

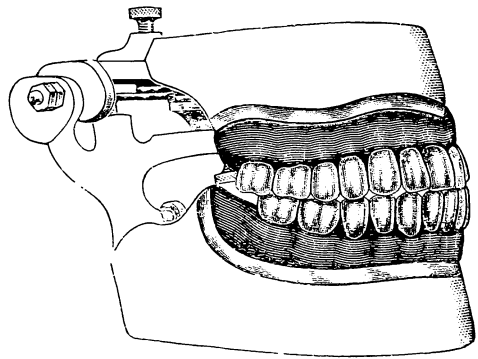


Fig. 8.

ranging them no consideration was taken of the overbite, nor the compensating curve, and the moment the mandible was thrown forward, or moved in any direction (except the hinge-like motion), there would be but a single point of contact, on the incisive edges of the anterior teeth. This, of course, would break the atmospheric adhesion and cause the upper plate to drop, and the lower plate would be displaced.

Later on is shown a full upper and lower denture, a duplicate of the one that the patient is now wearing. After the bite had been taken, it was then transferred (by the use of the facebow) from the patient's mouth to the articulator so that the cast in the articulator holds the same relative position to the joint, as the alveolar border does to the center of articulation.

The upper bite wax was then removed, and the superior ten anterior teeth properly arranged (Fig. 4). The lower bite wax was then removed, and commencing with the lower second bicuspid on either side,

they were placed so as to articulate between the superior bicuspid, and waxed firmly in position (Fig. 5):

The lower first bicuspid on either side was placed in position. The cuspids, the laterals, and the centrals, and, as each tooth was arranged, the oscillating motion was given the articulator to determine its proper position.

My reason for this method of articulating teeth is this: as the mandible is thrown forward, the mesial surface of the lower second bicuspid slides on the distal surface of the upper first bicuspid, and these two inclined surfaces govern both the overbite and compensating curve.

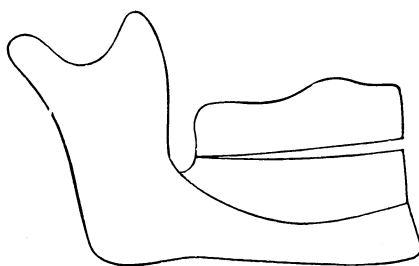


Fig. 9.

The lower posterior teeth are then arranged with an upward curve (Fig. 6), and the upper molars are arranged lastly (Fig. 7). The teeth are arranged in such a manner so that when the mandible is thrown forward, and the bicuspid, rise on the points of the cusps, the anterior and the posterior teeth will also be in contact (Fig. 8).

Another condition with which the dentist is constantly confronted is this, that when the facebow is not used, and the model is placed too far from joint in an articulator, and you are obliged to open the bite, then the teeth are placed in the mouth, the posterior teeth will strike first (Fig. 9).

Where the facebow and articulator are used, the bite can be closed or opened, should the case require it, and still the teeth will articulate properly, for this reason, that the articulator is moved on a radius of the same circle as the mandible.



Second District Dental Society.

January Meeting, 1902.

A regular meeting of the Second District Dental Society of the State of New York was held on Monday evening, January 13, 1902, at the "Argyle," Fulton and Pierrepont Streets, Brooklyn, with the President, Dr. W. J. Turner, in the chair.

Invitations for this meeting had been extended to the First District Dental Society of New York, the New York Odontological Society, the New York Institute of Stomatology, and the Central Dental Association of Northern New Jersey, and a large number of the members of these societies attended the meeting.

The President stated that all business would be dispensed with, except the reading of resolutions on the death of Professor Charles J. Essig. Dr. Ottolengui read such resolutions, and on motion the same were adopted.

The subject of the evening was "The Ethics and Prosthetics of Crown and Bridge Work," and the following gentlemen read papers: Dr. Hart J. Goslee, of Chicago; Dr. Wm. P. Cooke, of Boston, and Dr. Frederic A. Peeso, of Philadelphia.

Discussion.

The President. I want to express a word of hearty welcome to our guests, and it is our desire that all will feel perfectly at home and be at perfect liberty to take part in the discussion this evening.

If Dr. Bryant is in the room, we will be pleased to hear from him.

I did not expect to open the discussion. It is a
Dr. Bryant, Washington. very hard matter to take up a discussion of what might be termed the individual work of any one man.

The gentlemen who have had the floor before me have pretty well illustrated one fact—they do not seem to agree on any one point. They do not exactly disagree as to the essential features, but they judge from their own standpoint, from the work which has been under their hands. That is all that we can do. I might say I have had a little experience in bridge and crown work. The past fourteen years I have spent entirely in that line of work, but I do not think my work could be judged in comparison with others, for the simple reason that my work is almost entirely by methods of my own invention. I am a little surprised after reading the beautiful papers written by Dr. Goslee, and which have appeared in the *ITEMS OF INTEREST* in the past few months, to hear some statements made this evening, as the previous papers from him are the best I ever saw in print—perfectly practical. I take it that bridge and crown work depends solely upon two things—a regard to stress, and the ability of the operator. That, I think, was agreed upon by all who read papers tonight. Dr. Goslee, as I understand it, states that he removes the pulp from all teeth where he has crowned live teeth, even for bridging and for crowning.

Dr. Goslee. I did not say all teeth. I made some exceptions, but I think it is a general rule.

Dr. Bryant. I cannot say that I agree with him in that statement, for the very reason that my experience has been rather favorable to the other side. I know of but two or three cases where the pulp has died under a crown, or under a bridge, and, as one of the gentlemen stated, the tooth was entirely gone when I removed the crown. I suppose in cementing the bridge, being a very extensive piece, some saliva might have gotten into the tooth, and of course the cement would wash out under the circumstances. I cannot conceive of any reason for a man going to the trouble and subjecting his patient to the excessive pain of the removal of a pulp, unless there are certain circumstances, such as were mentioned by one of the gentlemen, where a considerable portion of the tooth was ground away and it became very painful, or the other case, where there was a pulp that was exposed.

“Is it warrantable to use window or open faced crowns, especially where the teeth to be crowned are sound?” Again my practice comes in play. My patients almost invariably are people from about the ages of fifty to eighty years. My object in life is to present them with something

to masticate with, to give them all the occluding surface that I can, and do it in as artistic a manner as possible; but I never let the artistic portion of it interfere with the strength. The open faced crowns I do not think are wanted, as a rule, but there are cases where they are, and it depends upon the individual conditions.

"Is it warrantable to incise the natural crowns of sound teeth in order to crown a root in bridge work?" It all depends upon what you have—the condition of the bridge, how many teeth you have to restore, etc.

"Should permanent bridges be made with or without saddles?" That is the subject that perhaps ten years from now will be decided by those who are investing in porcelain bridges at the present time. I have seen some saddle bridges that are doing good service, but wherever those cases are, I invariably find there is very little stress brought to bear upon the saddles—that is, extensive bridges with saddles—the upper or antagonizing teeth being few and far between.

I saw some work of the late L. T. Sharkey which was doing good service under the circumstances, but I do not think that saddles in a permanent bridge are the proper thing. In a removable bridge, of course, you must have a saddle.

As far as the hygienic conditions are concerned in the permanent bridges, it naturally depends upon two things—the method of construction of the bridge and the cleanliness of the patient. You cannot stand over patients and make them clean their teeth. I have some bridges that are very clean and kept in nice condition. I have others, put in some years ago, where it is hard to tell whether there is any bridge present or not. The permanent bridge, where the saddle is used, might be efficacious, provided there is a method of construction that allows of easy repair; but in my experience I have seen removable bridges which have remained in the mouth for a long time; patients are very peculiar. A bridge that is easy to slip out and in one would imagine they would take out once a month at least; but some never take them out for six months or a year, or until I see them again. Where the band is upon the tissues, as illustrated by Dr. Goslee, the epithelium detaches itself slightly; there is a white deposit, a little redness, and as the bridge has been in six months or a year without being removed, there is a little redness, but not a drop of blood, no odor nor anything that I could find fault with, except that it had pressed itself up into the tissue. If the bridge is taken out, cleaned and put back as it should be, there would be very little of that. I should expect to find the same conditions under the saddle bridge. The saddle in use as an extension I do not believe in at all, except where there is no antagonizing tooth above. A tooth will withstand any pressure up and down that you will put upon it, but it will not stand any lateral pressure.

No matter how strong your abutments may be, when you have an extension bridge extending over three or four teeth—four as they generally are, two bicuspid and two molars—there will be some movement. Wherever there is movement there is absorption, and where there is absorption there will be pressure on the abutments, and the abutments cannot stand.

“How should we supply a single anterior tooth, the adjacent teeth being sound, especially central incisors?” I am going to dodge that, just as the other gentlemen did. That depends on the case and the operator. It is a hard problem. Sometimes I insert in one way, and sometimes another. I do not believe in an extension bridge unless it is anchored on the other side. If you do not get the motion front and back, you will get it up and down. Where there is a looseness in the socket, nothing will keep it in, but it will get worse and worse. As for supplying the central incisors, I saw one today that I put in five years ago. It is the case of a gentleman in the City of Washington, a man large and strong enough to bite shingle nails in two. It is rather an extensive protrusion, as I call it. I extended a gold bar, or rather platinum-iridium with gold, over it from the second bicuspid clear around to the central on this side. I have had good success with those cases in a number of instances, but I think and my advice from my experience to the dentist would be to try a plate when it comes to the question of a single tooth.

In addition to the pleasure of meeting all my
Dr. Joseph Head, friends of the Brooklyn society, I wish to say that I
of Philadelphia. have never heard such a variety of expressions of
 opinion that had so much real substance in them.

There have been many special cases quoted tonight, and these special cases, of course, have given us the authority of fact; but what I would especially like to speak on is the paper of Dr. Goslee, who, while he has had large and varied experience in his individual cases, contented himself with laying down general principles which could be specifically discussed from a theoretical point of view, and it is with a few of those principles that I should like to deal this evening.

He very wisely spoke of the advantages and disadvantages that come to a tooth being rigidly held as in a vise by a bridge. That it gives certain advantages to a tooth that has a tendency to become loose, is undoubted; but we must remember that every appliance we put in the mouth that places a tooth in an abnormal condition is a disadvantage, and therefore wherever a bridge can be so constructed that the normal natural movement of the teeth can still be made, we should never neglect to retain that motion. For instance, where one or two teeth are to be put in between adjacent abutments, it is frequently advisable to have one abutment a simple crown with a slot in it and the entire bridge fastened to the other

abutment, so there will be a slight motion, but the real rigidity will be maintained when mastication is had. A floss silk can in almost every instance be worked down there, and as much cleanliness obtained as though a simple crown were used. That is something that brings me naturally to the question of saddles. I cannot but feel that a bridge which primarily depends upon the gum to sustain the pressure, is not based upon the best mechanical principles. I can understand perfectly that there may be circumstances in which this may be necessary and advantageous, but in my opinion the pressure of mastication should be entirely sustained by the adjacent abutments, and a saddle or the juxtaposition of the bridge to the gum should be in each instance merely for the purpose of cleanliness. Now Dr. Goslee and all of the advocates of the permanent bridge tonight have admitted that whenever those are removed, there is redness and inflammation.

Dr. Goslee.

I did not say inflammation, but a slight congestion.

Dr. Ottolengui.

Superficial stasis.

Dr. Head.

Personally, I object to superficial stasis and congestion, if it can be avoided, and for that reason, wherever possible, I use the removable bridge, and where that is not possible, I always make it so that the saddle is narrow enough to be almost flat, so that if the floss silk cannot be worked down between the abutment, where the pin is resting on another crown, it can be threaded in between the abutment and the adjacent tooth, and worked in underneath to both sides of the abutment; for I will admit that from the cases I have seen, and from what Dr. Goslee has said, as far as the perfection of the adaptation of a saddle goes on a permanent bridge, I think they go as far as the materials will permit. They bring the saddles in such close juxtaposition to the tissues as to keep the ingress of the fluids of the mouth at a minimum. However, irritation will occur, and congestion and superficial stasis, or something like that, will occur, and that is not advantageous.

I seriously think we should consider whether we are justified in bringing about a condition of this congestion that approaches inflammation of a chronic order, when removable bridges are available, and other bridges are available which can be cleansed by floss silk being run under them.

**Crowns in
Living Teeth.**

We now come to the question of the possibility or the advisability in each case of killing the pulp in teeth that are to be crowned and used as abutments.

This is a very large subject, and one that cannot be dealt with in an offhand way. In some mouths, where the patient has a tendency to rheumatism and gout, I should think it would

be dangerous, because the constant irritation caused by cutting away so much of the tooth structure would almost invariably tend to produce pulp stones. In fact, there are so many personal factors in such cases that generalization seems impossible. It seemed to have been brought out tonight, on the one hand, that many have done it and succeeded, and, on the other hand, that a few have done it and failed. The argument, however, that was brought forward tonight, that the pulp is a formative organ, is one well to remember; but we should still more remember that the pulp may also be an organ of destruction. There is a case noted by Dr. Gaskell, of Philadelphia, where the pulp at a certain time changed its method and dissolved the dentine. The pulp showed pink through the enamel, and the only way in which the tooth could be saved was by destroying the pulp and filling the canal. I have recently heard of another case similar to it, in Cleveland, where the young lady lost four or five teeth by the same process, and the only way they can be saved is by an almost universal destruction of the pulps.

With this fact in mind, we should remember that whenever a band goes down near the cementum, where the pulp is at all irritated, the pulp may irritate that cementum in addition to any irritation caused by the band, and therefore in many instances I do believe that a certain amount of disease may be given to the peridental membrane by an irritated pulp. Where such irritation is probable, certainly the destruction of the pulp is advisable; but I will also say, as all of us will who have had any experience in this work, that we have crowned teeth with live pulps that have given good service, and the pulps have lived for twelve or fifteen years.

Bands.

Now we come to a question that perhaps has not been dwelt upon as largely as I think it ought to have been—the question of bands. Every one tonight has spoken in favor of bands, and I for one heartily indorse everything they say on the subject; but we must remember that that terrible disease, pyorrhœa, has been largely traced to the accumulation of filth around the necks of teeth, and that any shoulder around the neck of a tooth is unquestionably a cause that may lead to pyorrhœa alveolaris. It is necessary at times that the tooth should be properly banded, but wherever a crown, especially in a bicuspid where there is a straight bite, can be safely and securely put on with a simple pin, I am apt to use those means alone. It has been my experience that as perfect an adaptation can be made with a porcelain crown as with a porcelain inlay, and where this perfect adaptation is attained, the stress and strain that might be given laterally upon the bicuspid would be so supported by the porcelain that there would be no danger of splitting the root. The strain on the pin would be longitudinal rather

than transverse. I only speak of this as a note of warning. I think we are all going to bands—I hope we will all end in golden bands—but as far as our dental work is concerned, I think the more nearly we can conform the tooth to its natural shape, that there may be perfect cleanliness according to the Creator's plan, the more likely we will be to have perfect success in our crowns and our bridges.

Dr. Ottolengui. I was a little bit surprised, Mr. President and gentlemen, that Dr. Head should seem to misunderstand or be unacquainted with the words: "superficial stasis," but after thinking it over, I have come to the conclusion that in Philadelphia the stasis is so general that he could not understand any superficial variety. I was not, in any sense of the word, attempting to prompt Dr. Head, or to explain anything to him; but he did what unfortunately often occurs, but which was perhaps excusable in this case because he had heard three papers read: he misquoted, saying redness and inflammation. Dr. Goslee was with me so much today that he was quite tired, and did not prompt Dr. Head, and I, as his warmest friend, perhaps, thought I would prompt him, and so said "superficial stasis." There being no stasis whatever in New York, I do not know anything about it.

**Pulp Destruction
in Crown Work.** It is rather difficult to discuss the papers of either of the last two essayists, because they have largely, we might say, recorded the methods that they personally use, and have referred to definite cases. It is interesting to note in this connection that one of the essayists, while condemning the idea of removing pulps before crowning teeth, subsequently admitted that the only two he had examined after crowning contained pulp stones, which is what those of us who remove the crowns are led to expect. I agree with Dr. Head in the idea that the pulp by becoming diseased may be a serious danger to the tooth. Whenever the subject of pulp destruction comes up, those who are opposed to it always throw at us the fact that the pulp is the formative organ and the source of nutrition, and everything of that kind. That is absolutely true only in sound teeth. Just as soon as the tooth has a cavity in it it is a diseased tooth, and it is a moot question to what extent the disease may have penetrated the tooth. Whether or not the pulp may be affected in superficial caries, in teeth where the disease has gone to such an extent that one is warranted in crowning, I doubt very much if any large proportion of such pulps are unaffected; consequently we have a pulp which, if originally the formative organ of that tooth, has to a large extent finished its function and outlived its usefulness, and there is a possibility that that pulp will subsequently die, and in the end menace the integrity of the work and lead

to the loss of the tooth and the entire structure. It is an exceedingly rare thing when the pulp is taken out and the tooth is treated according to the proper aseptic precautions, that any trouble ensues; therefore in making a bridge—where the abutment to be used is a tooth root—it does seem that it would be wiser to have a tooth from which you could not look for any possible future trouble. However successful individuals have been in specific cases in crowning these teeth, that is negative evidence. It is not evidence that it is safe to do it; it is only evidence that it has been done successfully in certain instances.

That brings me back to the paper of Dr. Goslee, which does enunciate principles. In spite of my warm friendship and extreme admiration for the Doctor as a dentist and a writer and a skillful practitioner, I am a little surprised at what seems to be a conflict in two parts of his paper. He has admitted the correctness of the theory (all theories having some exceptions which in this instance he has noted) that it is wiser and safer and better to remove the pulp from a tooth which is to be crowned or used as an abutment for a bridge. He then goes on (in a sense) to condemn the use of a window crown; but to my astonishment he made some exceptions in its favor. He said in some cases it might be used. The exception he made would be in my mind the last place where it should be used—that is, on the cuspid tooth. Starting from a premise that it is rational to remove the pulp, what logical excuse can there be for a window crown? We are told that the natural shape of the tooth must be altered; on the cuspid the widest portion must be cut away so it shall have parallel sides, and it can never look again like a natural cuspid, unless you put on golden wings, as it were, which certainly does not beautify it. Why not take the pulp out of that cuspid, and then we can very easily employ the tooth as an abutment, using a staple passing up into the root and fastened in place with a gold filling.

That brings me to the consideration of the placing of a single tooth in the front of the mouth. I cannot agree with Dr. Bryant that that question was dodged. One gentleman gave us a very good solution to the problem, and with some of the specimens he has shown tonight it is very evident that in the hands of any skilled workman it would be a very successful operation.

Now as to the question of a swing—that is, a
Extension Bridges. tooth that has an abutment only on one side.

I agree with Dr. Bryant that teeth will not permanently endure any lateral movement. Those cases which have succeeded are always cited as evidence that the methods are good, and those that have failed are put in the melting pot and new fixtures put on, but no record made of the failure. While the tooth

itself, which you use as an abutment, has considerable stability, the gum tissue lies between the saddle and the hard tissue below, and it is not very resistant to pressure. It is for this reason that I have felt that every artificial tooth which has an abutment on one side must have a rest on the other side. As an evidence of this, and while I have deprecated the citing of individual cases, I would like to state that I once put a central incisor tooth in the mouth, the crown of the lateral incisor having been lost and the root being left. The central incisor had a gold filling in it, but was alive. I devitalized that central incisor and passed a staple up into its root. That was attached to what is known as a Richmond crown on the lateral incisor root, and the intervening space filled with a facing that was fastened to the bar that passed across. That was worn about eight or ten years with satisfaction, and then the patient reported with the facing missing from the lateral incisor crown. I used the Bryant repair method, and fastened a new facing on, but the backing was rather thin, and in about a year the backing broke, allowing the new facing to come away. That, by the way, is the only failure I have had in that kind of repair work. The replacing of that Richmond crown rendered it necessary either to remove the entire fixture, to take out the gold filling and the staple which passed into the root of the central incisor on the other side, or else to do that which I did—that is, I sawed the bar away to put on a new Richmond crown, leaving the swing. Now I have to take the whole thing to pieces and do it over, because in six months without the support it should have had, the central incisor has tipped to such an extent that the swing is pressing tightly against the gum and irritating it, which is an argument that there should always be a rest on the opposite side. Dr. Head's suggestion that the rest might not be permanently attached, that the tooth may have as much natural movement as possible, is a good one.

The solution of nearly all those problems lies in what has been recommended by Dr. Bonwill—that is, removable fixtures so clasped that the pressure is upon the adjacent teeth.

While I have enjoyed the discussion that has
Dr. Goslee. been indulged in very much indeed, I think that almost every criticism that was made was really spoken of in my own paper. I have been criticised in three or four instances as having advocated something that I did not advocate, or the explanation of which was in the essay. I do not mean to be considered radical with regard to advocating the devitalization of the pulp in teeth that are to be subsequently crowned, and I think the other two essayists of the evening and Dr. Bryant of Washington have agreed in everything

I said in my own essay, while they appear to criticise the theory. When they say if considerable grinding is necessary it is perhaps best to devitalize the pulp, that is just the point I made. Usually in the large majority of cases considerable grinding is necessary. It was mentioned that those teeth which would require considerable grinding were the exceptions, but I differ from them in that statement. Bicuspid and molars require always a considerable amount of grinding in order to secure a condition of the coronal proportions that will give you a diameter equal to the diameter of the surface, and no one can dispute that in all normally shaped teeth those cases that require grinding are not the exception, but the general rule, and an actual measurement will convince any one of that, I think.

Dr. Ottolengui has mentioned that Dr. Peeso advocates leaving or retaining the vitality of the pulp, and says he has had no trouble in many years of practice by leaving the pulp alive in many cases; that the only two cases that he has had trouble with when he opened into them had pulp stones. I have seen many more than two, and yet my experience and my work in that line have not been greater than Dr. Peeso's, although I have had the benefit of a large amount of clinical work in the colleges which has been very advantageous to me. One thing Dr. Peeso said that I cannot allow to go unchallenged was to the effect that if the pulps in teeth carrying crowns did die, you could drill through the occlusal surface of the crown and successfully treat the canal. In the first place it might be a molar tooth which would add to the difficulty; but it is almost an impossibility in my hands, at least, to drill through the occlusal surface of crowns and gain access to the canal. It is difficult enough, as you all know, to perfectly fill the natural tooth when you have every opportunity to get at it.

The point, however, that he made that I agree with, and especially wish to emphasize, is the advantage of correct occlusion. I think many pulps die in teeth bearing crowns that have a faulty occlusion, and I wish to say we should be more careful in the construction of all of our posterior crowns to secure as good occlusion as possible, and in bridgework we should use an anatomical articulator as much as in artificial dentures. One reason why pulps die in teeth used as abutments, and the frequent necessity for repairing broken faces, is due to faulty occlusion. If we used an anatomical articulator, we could overcome many of those mishaps.

About extension bridges: While I deprecate the citation of individual cases, I do believe and I can show several practical cases to prove—and ~~when~~ I say several I mean a good number—that if extension bridges are

properly made and applied to those cases where they seem favorable they are in many instances eminently successful. Take for instance the lower posterior side of the mouth, where the molars have been lost and the upper opposing teeth are present. If you were to crown the two bicuspids, for instance, you could securely and permanently (reasonably so at least) carry a dummy that would give you an additional tooth for mastication, with every assurance of a fair degree of permanence, and if some teeth were missing on the opposite side you would be doing the patient a favor by supplying that missing tooth. The carrying or swinging of a lateral or central upon an adjacent tooth I believe is a successful operation under the conditions I have mentioned. I prefer, if I carry a central on a central to have a bar as suggested in the essay, but sometimes where a considerable amount of absorption has taken place, probably all that would take place, a saddle could be used, and if the bearing of the saddle upon the tissue is firm I do not think you will have much trouble with those cases. I have only been using saddles for special cases although I have seen beautiful results and successful ones with their use; but I believe that the degree of success obtained in those results has only been due to the care with which the adaptation to the tissue was secured, and also to the fact that absorption had taken place thoroughly.

The point Dr. Head mentioned, with regard to mobility, is a good one, and wherever I can construct a small bridge and have one end so it is possible to have mobility, I prefer it to securing both ends securely.

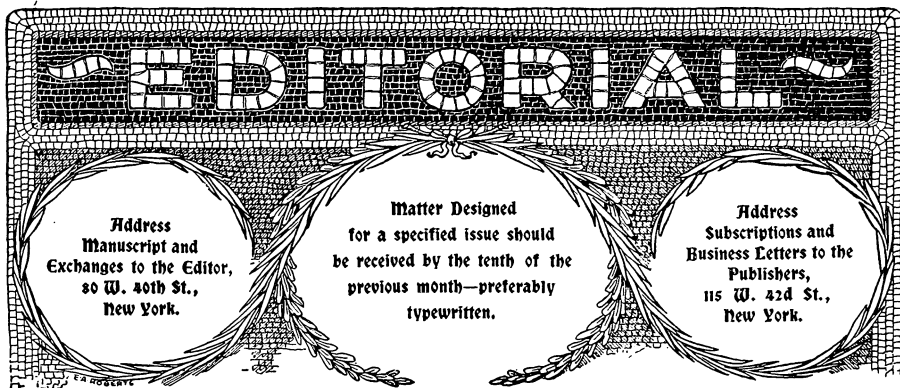
I do not believe "superficial stasis" resulting from the juxtaposition of the saddle to the tissue does any harm at all, and when I tell you that I have removed saddles after four or five years, removing them purposely for the sake of observation, and found them apparently clean in every detail and respect, I tell you truly, and all I have been able to notice, where I felt reasonably assured the adaptation was perfect, has been this slight exfoliation of the superficial layer of the epithelium. The tissue was always red under the saddle, but I stipulated prominently that I never found any soreness to pressure or any inflammation in any way, and I have not found it.

I agree with everything that has been said with regard to removable bridgework. If we have the proper means of attachment for removable bridgework, it would oftentimes be far preferable to stationary work, but in my opinion I know of no secure means of attachment that is universally applicable for removable bridgework, in the absence of which I shall still continue to construct stationary work along the lines I have endeavored to convey to you in the essay.

Dr. Peeso. Speaking of our citing special cases, and recording only those that were successes, I can say in all my practice I do not think there have been more than three or four failures, and with a general success like that, I think the work may be counted on as the proper method to pursue.

A vote of thanks was tendered to the essayists, after which the meeting adjourned to the banquet hall, where a collation was served.





Dental Fees. Dental Dignity. Dental Charity.

The country practitioner hears of the fabulous fees received by his *confreres* in the large cities, and many times is dissatisfied with the remuneration which he obtains for his own work. But what effort does this same man make in the way of increasing his own fees? In the majority of such cases, not any. Yet he owes it to himself, and also to all others of his profession, to get the very highest prices obtainable.

The revered William H. Atkinson did more than any other one man to establish the idea that dental services are worth a great deal of money. His own demands advertised to the community at large that there is a class of dentistry not procurable for a dollar an hour. He taught the people to appreciate and pay for good dentistry; and he taught the dentists to add dignity to their labor and exact a high fee therefor. A clinician once in Dr. Atkinson's presence spoke of his "tools." As swiftly as a hawk pouncing on his prey Dr. Atkinson turned on him and replied, sternly: "Your tools, sir? Are you a day laborer? If you wish to pass as a dentist hereafter remember

that you work with instruments, not tools. And you perform operations, not jobs."

Dr. Atkinson gave that man a lesson in professional appreciation; he taught him the meaning of dental dignity. And if dentistry is to be a dignified profession, the public at large must be taught that good dentistry is not cheap.

Unfortunately the doctrines of Dr. Atkinson seem to have died with him, and no other apostle has arisen in his stead to preach in the wilderness of dentistry that the aim should be for higher fees rather than more work at less money. On the contrary the tenets of commercialism is abroad in the land, and the feeling is spreading that the individual must be careful not to charge too much, lest his neighbor gain all the patronage. Thus we are following the trade laws of prices regulated by competition. As a professional body, the exact opposite should sway us in this matter. The competition, if there be any, should be towards furnishing the highest order of service; and there is no question that the man who succeeds in offering the best service in any community, small or large, will be discovered at length by the people; and that man will have the finest clientele and may charge the highest fees. There is, then, no greater error in the management of a practice than low fees. With every operation performed there should be a modest but none the less persistent effort made to enlighten the patient as to the importance of what is being done and the need of doing it in the most careful, skilful and thorough manner. Then in rendering a bill there should be no hesitation, in dealing with a stranger, to charge full fees. If beyond the means of the patient, let it be the patient himself who shall so determine, and if the patient's reasons for asking for a reduction seem fair and just, the discount may be made. Two things are gained by this means: First, in many instances the patient is better able to pay than the operator may imagine; in such cases a smaller bill would have represented just so much loss to the dentist. Secondly, when the bill is reduced, not only does the dentist receive what the patient can afford to pay, but the patient is taught the value of the service rendered, for be it remembered that usually "a man is taken at his own valuation."

It might be said that this doctrine of higher
Dental Charity. prices will react as a hardship upon the poor, but
analyzed it will be seen to be quite the reverse.

If every one who can pay full fees is made to do so, the dentist will better afford to work for next to nothing, or even for nothing at all, where there seems a worthy excuse for rendering charity. But with uniformly low fees, and a monthly dread of the rent collector, the dental practitioner finds it impossible to do any charity whatever. This, indeed, is one of the accusations which has been brought against dentists. We are told that physicians and surgeons of the highest class are giving without remuneration, time and attention to patients in charity wards in hospitals. This is true, of course, but there is an argument which could be used to show that this charity is not so charitable, nor so unselfish, as at first glance it may seem. But that is aside from the issue. It is a fact that dentists do less charity work than they should. There are individual exceptions of course, but aimed at the entire profession the accusation is true. The remedy lies in increasing our fees to those who can pay, in order that we may lessen them to those who cannot.





National Society Meetings.

- National Dental Association, Niagara Falls, N. Y., July 28, 29, 30.
National Association of Dental Examiners, Niagara Falls, N. Y.,
July 25.
National Association of Dental Faculties, Niagara Falls, N. Y.,
July 31.
American Society of Orthodontists, Philadelphia, Pa., Oct. 8, 9, 10.
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State Society Meetings.

- Arkansas State Dental Society, Little Rock, May 13, 14.
California State Dental Association, San Francisco, June 10.
Colorado State Dental Association, Colorado Springs, June 17, 18, 19.
Connecticut State Dental Association, Hartford, May 20, 21.
Delaware State Dental Society, Wilmington, July 2.
District of Columbia Dental Society, Washington, Dec. 16.
Florida State Dental Society, Daytona Beach, Daytona, May 28.
Georgia State Dental Society, Macon, June 10.
Illinois State Dental Society, Springfield, May 13, 14, 15.
Indiana State Dental Association, Lake Maxinkuckee, June 24, 25, 26.
Iowa State Dental Society, Des Moines, May 6, 7, 8, 9.
Kansas State Dental Association, Hutchinson, May 8, 9, 10.
Maine Dental Society, Camden, July 15, 16, 17.
Massachusetts State Dental Society, Boston, June 4, 5.
Michigan Dental Association, Grand Rapids, June.
Minnesota State Dental Association, St. Paul.
Mississippi Dental Association, Biloxi, May 20, 21, 22.
Missouri State Dental Association, Jefferson City, May 21, 22, 23.
Nebraska State Dental Society, Lincoln, May 20.
New Jersey State Dental Society, Asbury Park, July 16, 17, 18.

- New York State Dental Society, Albany, May 14, 15.
 North Carolina Dental Society, Raleigh, June 19, 20, 21.
 Ohio State Dental Society, Columbus, Dec. 2, 3, 4.
 Pennsylvania State Dental Society, Bedford Springs, July 8, 9, 10.
 Rhode Island Dental Society, July 8.
 South Carolina State Dental Association, Charleston, May 13, 14, 15.
 Tennessee Dental Association, Monteagle, July 1.
 Texas State Dental Association, Waco, May 13, 14, 15.
 Washington State Dental Society, Tacoma, May 22, 23, 24.
 Wisconsin State Dental Society, Milwaukee, July 15, 16, 17.
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American Medical Association, Section on Stomatology.

Meeting to be held at Saratoga Springs, New York, June 10-13, 1902.

Programme.

1. Chairman's Address. Dr. A. H. Peck, Chicago, Ill.
2. The Embryology of the Dental Pulp. Dr. R. R. Andrews, Cambridge, Mass.
3. The Histology of the Pulp. Dr. Vida A. Latham, Chicago, Ill.
4. Notes of the Preparation of Teeth for the Microscope. Dr. Martha Anderson, Moline, Ill.
5. Evolution of the Pulp. Dr. Eugene S. Talbot, Chicago, Ill.
6. A Comparative Study of the Attachment of Teeth, Dr. Frederick Noyes, Chicago, Ill.
7. Permanent Benefit Resulting from the Correction of Irregularities of the Teeth due to Interstitial Gingivitis. Dr. M. H. Fletcher, Cincinnati, Ohio.
8. Observations on Some Recent Cases of Orthodontia, With Illustrations. Dr. E. A. Bogue, New York City, N. Y.
9. General Nervous Manifestations in Relation to the Jaws and Teeth. Dr. G. V. I. Brown, Milwaukee, Wis.
10. Electric Ozonation upon Neuralgia. Dr. G. Lenox Curtis, New York City.
11. Diagnosis. Dr. Jonathan Taft, Cincinnati, Ohio.
12. The Modern Dentist from a Medical Standpoint. Dr. Wm. Knight, Cincinnati, Ohio.
13. Chancre of the Lip. Dr. G. T. Carpenter, Chicago, Ill.
14. Oral Hygiene. Dr. G. F. Eames, Boston, Mass.

15. The Legal Status of the Term "Reputable" as Applied to Dental Colleges. Dr. Chas. Chittenden, Madison, Wis.

16. Auto-infection of the Mouth. Dr. G. L. Parmele, Hartford, Conn.

17. Dento-Facial Orthopedia. Dr. W. E. Walker, New Orleans, La.

Dentists desiring to become members of the section can do so by obtaining credentials from their State or local dental society and presenting them with the sum of five dollars (\$5.00) to the Treasurer of the Association. This sum includes the Journal of the Association for one year. All dentists are invited to attend and take part in the discussions.

A. H. PECK, Chairman.

EUGENE S. TALBOT, Secretary.

Committee on Art and Invention of the New Jersey State Dental Society.

To all those who during the past year have invented or designed any instrument, appliance, method or operation in or applicable to the art and science of Dental Surgery:

The New Jersey State Dental Society respectfully solicits you to send a contribution of such article or appliance that you have invented or designed, with full description of the same.

All appliances will be classified and receive due consideration at the hands of the Society. We only stipulate that all articles sent shall be of practical value and of general interest to the profession at large.

We will make an interesting exhibit under the head of Art and Invention; one that will be of value not only to the profession, but also to the inventors and designers.

A full report will be made and printed in the Society proceedings.

Send contributions by June 24 and not later than July 1. Otherwise they may not receive proper classification.

All appliances will be well taken care of and returned to the contributors after the session of the Society, which will be held in the Auditorium at Asbury Park, New Jersey, July 16, 17 and 18, 1902.

This year's session will be one of, if not the largest, both in interest and attendance, of any previous session of the New Jersey State Dental Society, which is known for its interesting, valuable and well attended sessions.

W. G. CHASE, Chairman.

1018 Witherspoon Bldg., Philadelphia, Pa.

Missouri State Dental Association.

The thirty-eighth annual session of the Missouri State Dental Association will convene at Jefferson City, May 21, 22, 23, 1902.

At 9. a. m. of the first day routine business will be transacted at Legislative Hall until adjournment at 10 a. m. to State penitentiary, where first day's clinic will be held.

Heretofore the first day has been wasted; to prevent this, members are urged to be present at the opening session, as an unusually large programme necessitates improving every moment of our time.

Hotel rates at Jefferson City, \$2.00 to \$3.00 per day. Railroad rates of one and one-third fare on the certificate plan have been secured.

Wednesday evening lantern lecture by George Washington Cook of Chicago: "Some Pathological Changes in Tissue Illustrated With Exhibition of Bacteriological Specimens."

Thursday evening no session on account of a reception at the Executive Mansion, given by Governor and Mrs. A. M. Dockery, complimentary to members of Missouri State Dental Association and visitors.

Addresses, Essays and Discussions.

Address of Welcome.—Alexander Monroe Dockery, M. D., Governor of Missouri.

Response Address of Welcome.—F. H. Achelpohl, St. Charles.

President's Annual Address.—Burton Lee Thorpe, St. Louis. Discussion opened by W. L. Reed, Mexico; F. F. Fletcher, St. Louis.

Metallurgy.—D. R. Stubblefield, Nashville, Tenn. Discussion opened by Hermann Prinz, St. Louis; Henry B. Purl, Kirksville.

Dental Prescriptions.—J. Robert Megraw, Fayette. Discussion opened by T. W. Arnold, Butler; Otis Hudson, Pierce City.

Etiology of Dental Disease.—J. D. Patterson, Kansas City. Discussion opened by O. M. Bedell, St. Louis; F. G. Worthley, Kansas City.

How to Recognize Hysterical Symptoms Located in the Face, Teeth and Jaws.—Charles Gilbert Chaddock, M.D., St. Louis. Discussion opened by Wm. Conrad, St. Louis; F. M. Fulkerson, Sedalia.

Alveolar Abscess, Its Sequel and Surgical Treatment.—Frederick Brown Moorehead, Chicago. Discussion opened by M. C. Marshall, St. Louis; R. J. Winn, Bolivar.

Some State Board Questions and the Answers They Receive.—S. C. A. Rubey, Clinton. Discussion opened by H. S. Lowry, Kansas City. W. W. Birkhead, Louisiana.

The Practical Application of Electricity in Surgery and Kindred Subjects.—Millard Lewis Lipscomb, A.M., Missouri State University, Columbia. Discussion opened by J. S. Letord, Kansas City; J. T. Fry, Moberly.

Orthodontia.—H. S. Vaughn, Kansas City. Discussion opened by C. D. Lukens, St. Louis; H. B. McMillen, Kansas City.

Some of the Newer Dental Remedies.—Hermann Prinz, St. Louis. Discussion opened by J. F. Wallace, Canton; J. Robert Megraw, Fayette.

The Griswold System of Removable Bridgework.—William Everett Griswold, New York. Discussion opened by Walter M. Bartlett, St. Louis; H. H. Sullivan, Kansas City.

Conservatism in Dentistry.—James W. Hull, Kansas City. Discussion opened by Wm. Carter, Sedalia; W. L. Bridgeford, Macon.

Comparative Anatomy of the Teeth.—D. F. Luckey, D.V.S., Missouri State Board of Agriculture, Columbia. Discussion opened by M. D. Hamisfar, Warrensburg; Richard Summa, St. Louis.

The Use and Abuse of Crown and Bridgework.—W. W. Flora, Carthage. Discussion opened by J. F. McWilliams, Mexico; J. H. Kennerly, St. Louis.

Report of Committee on New Inventions and Appliances.—Otto J. Fruth, St. Louis.

Lantern Lecture, Some Pathological Changes in Tissue Illustrated With Exhibit of Bacteriological Specimens.—George Washington Cook. Discussion opened by J. D. Patterson, Kansas City; S. T. Bassett, St. Louis.

Clinics First Day, May 21—10 A.M.

M. C. MARSHALL, St. Louis, Supervisor.
J. W. HULL and S. T. BASSETT, Assistants.

Methods of Filling With Cohesive and Non-cohesive Gold and Tin Foils.—A. J. Prosser, St. Louis.

The Use of Gold Inlays in Deciduous and Frail Teeth.—R. H. Mace, St. Louis.

Mounting Logan Crown With Cap.—Herbert P. Neeper, Canton; Edward G. Snodgrass, Keokuk.

Table Clinic: Some Odds and Ends.—John G. Harper, St. Louis.

Preparing Cavities in Porcelain Teeth.—F. B. Jahr, Kansas City.

Treatment of Alveolar Abscess With Fistulous Opening and Immediate Root Filling.—J. Robert Megraw, Fayette.

Gold Fillings.—M. R. Windhorst, St. Louis.

New Treatment for Epule's Tumors, Oral Ulcers, Gum Tissue Between the Teeth in Approximal Cavities and Sensitive Denture.—J. Denzil Bowles, Tipton.

Operation for Necrosis.—F. A. Schultz, St. Louis.

Demonstrating Use of Archite Cement.—R. R. Vaughn, St. Louis.

Extracting With Nitrous Oxide Gas, Demonstrating New Universal Lower Forcep.—Geo. H. Mathae, St. Louis.

Obturator for Cleft Palate.—A. F. Strange, St. Louis.

Construction of Porcelain Bridge.—Robert N. LeCron, St. Louis.

Bridgework With Removable Facings.—V. H. Frederick, St. Louis.

Demonstrating a New "Rheostat."—J. S. Letord, Kansas City; Henri Letord, Kansas City.

Orthodontia.—C. D. Lukens, St. Louis.

Table Clinic.—F. F. Fletcher, St. Louis.

Immediate and Painless Checking of Hemorrhage.—J. W. Hull, Kansas City.

Cleansing a Set of Teeth.—Geo. H. Gibson, St. Louis.

Black's Method of Step Cavity Preparation.—Henry B. Purl, Kirksville.

Richmond Crown.—W. W. Flora, Carthage.

Adjusting Rubber Dam and Filling Root Canals, Demonstrating Rubber Dam Holder and Aseptic Broaches.—L. A. Young, St. Louis.

Cavity Preparation and Finishing Alloy Fillings.—J. A. Austin, St. Louis.

New Safe Anæsthetic for Extracting and Minor Surgical Operations.—D. N. Boatner, Trenton.

Table Clinic: Porcelain Work and a New Crown System.—H. H. Sullivan, Kansas City.

Porcelain Crown.—J. McMillan, Kansas City.

Will Swage Seamless Crown.—Frank McMillan, Kansas City.

The Preparation of Cavities, Illustrating Same in Ivory Tooth Forms.—J. F. Wallace, Canton.

Clinics Second Day, May 22—9 A.M.

The Griswold System of Removable Bridgework.—William Everett Griswold, New York.

Surgical Treatment of Alveolar Abscess.—Frederick Brown Moorehead, Chicago.

Step-Filling, Using Watt's Crystal Gold.—Edward G. Snodgrass, Keokuk.

Something in Porcelain Work: Baking With Gasoline and Gas Furnaces.—R. C. Brophy, Chicago.

Table Clinic: My Method of Root Canal Filling With Gutta Percha and Wood Points, Also Taking Impressions of Enlarged or Undeveloped Root Canals.—B. Q. Stevens, Hannibal.

Immediate and Painless Pulp Extirpation in Anterior Teeth.—F. M. Fulkerson, Sedalia.

Taking Impressions of the Mouth.—J. H. Kennerly, St. Louis.

Porcelain Inlays.—D. O. M. LeCron, St. Louis.

Gold Inlays, Swaged and Burnished.—A. J. Prosser, St. Louis.

Method of Retaining Loose Teeth With Splints.—Orme H. Manhard, St. Louis.

Demonstrate the Jackson Crib System for Irregularities.—H. S. Vaughn, Kansas City.

Articulated Natural Teeth for Cavity Preparation.—W. L. Reed, Mexico.

Demonstration of Some of the Newer Dental Remedies.—Hermann Prinz, St. Louis.

Gold Fillings, Vernon's Gold and Eaff's Gold and Platinum.—J. S. Letord, Kansas City.

Method of Seamless Crown and Bridgework.—Ed. S. Brown, Edina.

Gold Filling Labio-Cervical Cavity, Using a Clamp of Own Design.—C. B. Sawyer, Jacksonville, Ill.

Painless Extraction.—R. J. Winn, Bolivar.

Gold Inlays.—Otto J. Fruth, St. Louis.

- (1) Combination Filling of Gold and Amalgam to Bar Oral Fluids;
- (2) Preparation of Cavity Painless by Analgesic Use of Chloroform (patient member of the association).—A. C. Hewett, Chicago.

Alloy Fillings With View to the Least Possible Amount of Contraction.—J. K. Conroy, Belleville, Ill.

F. H. Achelpohl, St. Charles, will demonstrate the use of Teague's cavity cap disks.

GEO. W. TAMLER, JR.,

C. D. LUKENS,

J. C. PASQUETH,

Executive Committee.

New York State Dental Society.

The thirty-fourth annual meeting of the New York State Dental Society will be held at the Hotel Ten Eyck, Albany, N. Y., Wednesday and Thursday, May 14 and 15, beginning promptly at 10 o'clock a. m. Wednesday. The following program will be presented:

President's Address. Dr. John I. Hart, New York.

Correspondent's Report. Dr. H. D. Hatch, New York.

Report Committee on Practice. Dr. A. R. Cooke, Syracuse, N. Y.

Essay—Root Fillings and Their Relative Value. Dr. Leo Greenbaum, Philadelphia, Pa.

Essay—The Practical Side of It. Dr. S. S. Sterner, Pittsfield, Mass.

Essay—Comparative Value of Ordinary Sealings for Root Dressings as Excluders of Bacteria. Dr. A. E. Webster, Toronto, Ont.

Essay—Cements (with report of committee). Dr. W. V. B. Ames, Chicago, Ill.

Essay—Extension for Prevention. Dr. R. H. Hofheinz, Rochester, N. Y.

Essay—Porcelain Crown and Bridge Work from the Hygienic Point of View. Dr. J. Head, Philadelphia, Pa.

Headquarters, Hotel Ten Eyck, where special rates have been secured, \$3.50 per day. Special railroad rates on the certificate plan have been arranged on all the trunk lines for one fare and a third for the round trip. Be sure and get your certificate when you purchase your ticket.

Members of the profession are cordially invited.

DR. JOHN I. HART, Pres., New York.

DR. W. A. WHITE, Sec'y, Phelps, N. Y.

Louisiana State Board of Dentistry.

The requirements for registration entitling candidates to practice dentistry in the State of Louisiana are as follows:

(a) A good moral character.

(b) Twenty-one years of age.

(c) Graduation in dentistry from a college belonging to the National Association of Dental Faculties or recognized by the National Association of Dental Examiners.

(d) An examination by the Louisiana State Board of Dentistry in the following branches: Anatomy, physiology, chemistry, materia medica,

therapeutics, pathology, dental surgery and oral surgery, microscopy, histology, prosthetic dentistry, operative dentistry and metallurgy. Average, seventy-five per centum.

(e) Fee, twenty-five dollars, payable in advance.

The next examination by the Board will be held in the city of New Orleans during the first week of May, 1902.

L. A. HULBERT, Atty. and Secy.

137 Carondelet St., New Orleans, La.

International Dental Federation.

The session of the International Dental Federation will be held in Stockholm, Sweden, from Aug. 15 to Aug. 20, 1902.

The projected meeting cannot take place either the first or second week in August. If the first week had been chosen, the German dentists would have been entirely hindered from being present, as the annual meeting of the Central-Verein für Zahnärzte takes place in Munich the 4th of August.

On the other hand, by reason of the proximity to Munich of Austria and Switzerland, it is possible that a number of dentists of these two countries will be present at the German meeting; they cannot, therefore, go to Stockholm.

The English dentists, in order to be in the latter city the first week of August, would have to leave their patients before the normal time of holidays, and therefore cannot be in the capital at that time.

Moreover, the French dentists are in the same position as their English colleagues, since vacations do not begin until the closing of schools, academies and colleges, that is, at the beginning of August. Moreover, if the session at Stockholm opened the first week of August, they would be compelled to take a long and fatiguing journey without stop, obliged to take part in France at Montanbau, the 7th of August, in the National Congress, i. e., the reunion of the Section for Odontology of the French Association for the Advancement of Science, which ends the 14th.

Several American dentists whose participation in the Federation is of very great importance have also advised the Bureau that it would be impossible to arrive in Stockholm before Aug. 12.

Our Swedish colleagues on the other hand have advised us that it would be well to hold the several meetings not later than the middle of August.

Taking into consideration, therefore, the several reasons precluding, the organizations of the various American Societies in Europe, especially the American Dental Society of Europe and the Dental Advisory Boards, have just fixed their meetings almost at the same time as the session of the Federation.

DR. GODOIN, President.

DR. SAUVEZ, Sec'y Gen., 45 Rue de la Tour d'Auvergne, Paris, France.

Arkansas State Board of Dental Examiners.

The Arkansas State Board of Dental Examiners will hold a meeting in Little Rock, May 13 and 14.

All candidates for license should have their applications in by May 12, and come with material and instruments to demonstrate their ability in operative dentistry.

W. H. MARSHALL, Sec'y and Treas.

Little Rock, Ark.

Arkansas State Dental Society.

The Arkansas State Dental Society will hold its third annual meeting at Little Rock, on Tuesday and Wednesday, May 13 and 14.

A large attendance is expected, and an exceptionally interesting programme is promised. Several prominent men from outside the State will be in attendance and take part. All members of the profession are cordially invited to attend.

E. L. WATSON, Secy.

Little Rock, Ark.

National Association of Dental Faculties.

The nineteenth annual convention of the National Association of Dental Faculties will convene in the ball room of the International Hotel, Niagara Falls, New York, July 24 next. The Executive Committee will meet at 11 a. m., July 23.

All colleges are respectfully referred to rule requiring that their annual announcement be in the hands of the Executive Committee at this meeting.

H. B. TILESTON, President.

S. W. FOSTER, Secretary Executive Committee N. A. D. F.

National Dental Association.

In accordance with the result of the recent postal card vote, the date of the coming meeting of the National Dental Association will be changed from the first Tuesday of August to Monday, July 28, and will continue four days.

A. H. PECK, Recording Secretary.

92 State St., Chicago, Ill.

Massachusetts Board of Registration in Dentistry.

A meeting of the Massachusetts Board of Registration in Dentistry, for the examination of candidates, will be held in Boston, Mass., June 25, 26 and 27, 1902.

Candidates who have applied for examination will report to the Secretary, Wednesday, June 25, at 9.30 a. m., at Harvard Dental Infirmary, North Grove Street, and come prepared with rubber-dam, gold and instruments, to demonstrate his skill in operative dentistry. Any one who wishes may bring his patient. So far as possible patients will be furnished. The Board in every instance selects the cavity to be filled. Partially prepared cavities never accepted.

The theoretic examination—written—will include operative dentistry, prosthetic dentistry, crown and bridge work, orthodontia, anatomy, histology, surgery, pathology, materia medica, therapeutics, physiology, bacteriology, anesthesia, chemistry and metallurgy, and will be held at Civil Service Rooms, State House, from Thursday, June 26, at 9.30 a. m., until Friday p. m., June 27.

All applications, together with the fee of twenty dollars, must be filed with the Secretary of the Board on or before June 18, as no application for this meeting will be received after that date.

Each candidate for examination must be twenty-one years of age.

Application blanks may be obtained from the Secretary.

Candidates who have taken an examination, and failed, and desire to come before the Board again at this meeting are not required to fill out a second application blank, but must notify the Secretary as above in order to be examined. The fee for third and subsequent examinations is \$5.00.

G. E. MITCHELL, D.D.S., Secretary.

25 Merrimack St., Haverhill, Mass.